

GREEN SUPPLY CHAIN PRACTICES AND ENVIRONMENTAL SUSTAINABILITY OF FOOD PROCESSING COMPANIES IN RIVERS STATE

OMOTOSO Omotayo Patrick

Department of Marketing, Faculty of Administration and Management,
Rivers State University Nkpolu-Oroworukwo, Port Harcourt, Nigeria
omotayo.omotoso@ust.edu.ng

IKEGWURU Mac-Kingsley

Department of logistics and Supply Chain Management
Faculty of Administration and Management,
Rivers State University Nkpolu-Oroworukwo, Port Harcourt, Nigeria

Abstract

This study examined the relationship between green supply chain (GSC) practices and environmental sustainability of food processing companies in Rivers State. The objective of the study was to determine the correlation between GSC practices and measures of environmental sustainability (waste reduction, decreased carbon footprint) of food processing companies in Rivers State. The study adopted a correlational research design. The population of the study consisted 15 registered and functional Food Processing Companies. The study did a total enumeration. Primary data was collected using questionnaire; while the hypotheses were tested using Spearman's Rank Order Correlation. The findings revealed that a very strong positive correlation between GSC practices and measures of environmental sustainability (waste reduction, decreased carbon footprint) of food processing companies in Rivers State. Thus, the study concluded that GSC practices significantly relate to environmental sustainability of food processing companies in Rivers State; and recommends that management of processing companies in Rivers State should incorporate ecological initiatives in their procurement processes in order to increase their environmental sustainability.

Keywords: Decreased carbon footprint, environmental sustainability, green supply chain management practices, waste reduction

Introduction

The subject of environmental sustainability has been of immense concern to organizations across the globe and a management challenge of the 21st century (Jawaad & Zafar, 2020). The necessity for sustainable environment is acknowledged to be a consequence of general boost in the consumer awareness of deficient environmental protection and social imbalance. According to Shah and Rahim (2019), environmental sustainability is the ability to maintain an ecological balance in our planet's natural environment and conserve natural resources to support the wellbeing of current and future generations.

Ikegwuru and Akani (2020) informs that environmental sustainability induce companies not only to consider short-term goals, but also, consider long-term effect of business activities on the natural environment. To optimize sustainability, every organization needs to balance their social, environmental and economic objectives (Shah & Rahim, 2019). Companies are developing new and improving current methods to enhance environmental sustainability, due to global market demands.

Green supply chain (GSC) has been considered a key strategy for environmental improvement and sustainability, as environmental sustainability become an important objective of firms (Jemai et al., 2020). This is mostly in response to global need to cut down the level of pollution caused to

the environment by human activities. GSC entails the use of recycled products, energy efficient products and standby power devices, fuel efficient vehicles, bio based products, non-ozone depleting substances and environmental protection, priority chemical and reduction of carbon dioxide emissions.

GSC is an up-to-date and accepted trend that smoothen the progress of environment sustainability globally, by presenting a holistic model in which material sourcing, product development, manufacturing, distribution, consumption and disposal of products are implemented in a manner that is less damaging to the environment. Luthra et al. (2016) states that the aim of GSC is to minimize the amount of waste and pollution produced, avoid using dangerous materials, and lessen the impact of business activities on the environment.

The food processing industry is an important sector of Nigeria economy that makes contributes substantially to the country's development (Economic Survey, 2013). Unfortunately, firms in the industry have been cited as leading culprits in environmental degradation since they are at the heart of the supply chain, since large volumes of products originate and flow through them. Thus, the concept of GSC is gaining importance among firms in sector, since it can help to minimize negative impact of their activities while enhancing their competitive advantage (Awino, 2007).

As the population becomes increasingly knowledgeable, food processing companies face increased demand for environmental accountability and quality products. Hence, they are required to implement green practices in their supply chain management activities. GSC practices reduce resource consumption, and production costs, while improving product quality, supply chain efficiency, and competitive advantage (Handfield et al., 1997). GSC practices also eliminate waste and improve efficiency of manufacturing processes, thereby creating positive impact on environmental sustainability and organizational performance (Vanalle et al., 2017) and enhances long-term values of companies (Ananda et al., 2018).

A number of studies have been conducted on GSC practices. Pratiwa and Widodob (2019) investigated impact of GSC practices on corporate sustainability of the food industry in Indonesia; Ikegwuru and Pokubo (2018) provide empirical evidence on GSC practices and environmental performance in retail fuel stations in Nigeria; Yu and Ramanathan (2015) examined stakeholders pressures, green operations and environmental performance; Zhu et al. (2012) assessed effects of GSC practices and their mediations on performance improvements, and Zhu et al. (2007) studied GSC practices and performance of firms in the automobile industry. Masri and Jaaron (2017) evaluated impact of GSC practices on environmental performance of Palestinian manufacturing firms.

The foregoing studies betray the paucity of research on GSC practices on environmental sustainability in emerging economies like Nigeria. These studies also failed to consider the impact of GSC practices on environmental sustainability of food processing companies. Therefore, this study was designed to fill this research gap by probing the relationship between GSC practices and environmental sustainability of food processing companies in Rivers State. The study posed the following research questions:

1. What is the relationship between GSC practices and waste reduction of food processing companies in Rivers State?

2. What is the relationship between GSC practices and decreased carbon footprint of food processing companies in Rivers State?

Theoretical Framework

The study is anchored on ecological modernization theory (EMT) developed by Spaargaren and Mol (1992). As a systematic eco-innovation model, EMT is channeled towards shared accomplishment of industrial development and environmental protection through innovation and technology (Janicke, 2008; Murphy & Gouldson, 2000). EMT posits that ecological regulations and policies can induce GCS practices among manufacturers (Janicke, 2008).

Scholars contend that EMT is the foundation of environmental policy integration by manufacturing firms (Gibbs, 2000), and such environmental policy is required for GSC development (Berger et al., 2001). To promote GSC practices, appropriate institutional preparations and legal frameworks by governments are desired (Kassolis, 2007).

EMT has been extensively engaged to give details of environmental planning by companies and their configuration of production in an approach that minimizes environmental impact (Murphy, 2000). Firms that invest in ecological renovation will profit from enhanced economic and environmental performance (Janicke, 2008). Huber (2000) notes that industrial ecology, of which GSC is a central facet, can facilitate the realization of sustainable development as a significant ecological modernization concept. Scholarly inquiries on GSC practices anchored on EMT show how environmental policy can uphold the espousal of GSC practices and revealed that GSC can convey both economic and environmental performance (Hall, 2001).

Concept of Green Supply Chain Practices

The concept of GSC was birthed by concerns on environmental issues. Testa and Iraldo (2010) and Azevedo et al. (2011) suggests that GSC practices refer to effort at greening the supply procedure, product based practices, delivery procedure and green practices through collaboration with suppliers and customers.

GSC practices are efforts undertaken by an organisation to minimise negative environmental impact during the entire life cycle of products, starting from the design, procurement of raw materials, use and final disposal of the product (Khairani et al., 2017). Sarkis (2012) and Srivastava (2007) suggests that GSC practices includes the incorporation of environmental attributes into SCM processes (product design, procurement, manufacturing, distribution, and end of life product management) to gain sustainable competitive advantage.

GSC as a concept is gaining more attention and implementation in manufacturing firms due to the realization of the fact that customers are in demand for goods and services that are environmentally sound and are produced or rendered through environmentally sustainable practices which are in line with environmental regulations of the state (Green et al., 2012).

Environmental Sustainability

The term “environment” in its simplest form represents what surrounds us (Nwanne, 2013). Hagget (1975, as cited in Anijah-Obi, 2001) aver that environment refers to the summation of all settings that surround man at any point on the earth’s surface; while The United Nations (1987) defines sustainability as that which “meets the needs of the present without compromising the ability of

the future generations to meet their own goals”. Sustainability is the upholding of equilibrium amid the environment, economy and man.

Gbenda (2012) define environmental sustainability as the conservation, management and rational exploitation of natural resources in ways to uphold the integrity of each ecosystem, support all life, guarantee the preservation of biodiversity and put off environmental degradation. Ikegwuru and Akani (2020) informs that, environmental sustainability induces companies not only to consider generating short term attainments in business, but also, consider the long term effect their businesses have on the natural environment. Therefore, environmental sustainability is the facility to connect in economic activities devoid of pessimistically damaging the environment. In this study, environmental sustainability is measured using waste and carbon footprint reduction.

Waste reduction

Waste reduction is the practice of using less material and energy to minimize waste generation and preserve natural resources. Waste reduction includes reusing products such as plastic and glass containers, purchasing more durable products, and using reusable products, such as dishrags instead of paper towels. Donating products, from office equipment to eyeglasses and clothing, reduces the amount of material manufactured overall (Alireza & Mahdi, 2012). In general, waste reduction offers several environmental benefits. Greater efficiency in the production and use of products means less energy consumption, resulting in less pollution.

Waste reduction also means economic savings. Fewer materials and less energy is used when waste-reduction practices are applied. Rather than using the traditional cradle-to-grave approach, a cradle-to-cradle system is adopted. In this cradle-to-cradle system, also called industrial ecology, products are not used for a finite length of time. Instead of disposing materials, or components of a product after a single use, products are passed on for further uses. This is considered a flow of materials. Waste-disposal costs are decreased because fewer materials end up as waste (Alireza & Mahdi, 2012).

Carbon footprint reduction

A carbon footprint is the total amount of greenhouse gases (including carbon dioxide and methane) that are generated by our actions. It is the total greenhouse gas (GHG) emissions caused directly and indirectly by an individual, organization, event or product (Wright et al., 2011). It is calculated by summing emissions resulting from every stage of a product lifetime (material production, manufacturing, use, and end-of-life).

Carbon footprints are usually reported in tonnes of emissions (CO₂-equivalent) per unit of comparison. Such units can be for example tonnes CO₂-eq per year, per kilogram of protein for consumption, per kilometer travelled, per piece of clothing and so forth. A product's carbon footprint includes the emissions for the entire life cycle. These run from the production along the supply chain to its final consumption and disposal (Wright et al., 2011).

Similarly, an organization's carbon footprint includes the direct as well as the indirect emissions that it causes. For climate change mitigation activities, the carbon footprint help to distinguish economic activities with a high footprint from those with a low footprint (Wright et al., 2011). So the carbon footprint concept allows everyone to make comparisons between the climate impacts of individuals, products, companies and countries. It also helps people devise strategies and priorities for reducing the carbon footprint.

Green Supply Chain Practices and Environmental Sustainability

Literature suggests affluent discernment into the embedded blueprints of GSC practices for humanizing environmental sustainability (Pratiwa & Widodob, 2019; Ikegwuru & Pokubo, 2018; Yu & Ramanathan, 2015; Zhu et al., 2012; Sungchul & Alex, 2011; Zhu & Sarkis, 2007). Extant literature conceives the implementation of GSC practices as a key to enhanced environmental sustainability.

Ikegwuru and Akani (2020) showed that green purchasing, green manufacturing, green packaging, green distribution and green marketing have direct positive effect on environmental sustainability in the food industry in Rivers State of Nigeria. Similarly, Zhang et al. (2020) on the other hand, revealed that institutional pressures have significant positive impact on GSC practices and business performance. Moreover, GSC practices were noted to have significant positive impact on environmental, operational and economic performance of firms.

Jermisittiparsert et al. (2019) found that green purchasing; green logistics and legislation that enforce sustainability significantly drive sustainability performance of firms. This study of Jermisittiparsert et al. (2019) reported that firms are influenced by external forces to adapt to green practices which in the long run lead to sustainability performance.

Relatedly, Ikegwuru and Pokubo (2018) provides empirical validation to the idea that GSC practices that inform economic sustainability also drive environmental sustainability and performance. This is even as Tan et al. (2016) showed that green purchasing and green production influence firm competitiveness. This position affirms that anecdote that a firm's competitiveness will be greater with higher level of green purchasing and green production practices.

Also, Liu et al. (2011) substantiates that a firms environmental management capacities is strongly enhanced by regular internal training of employees to boost its participation in GSC practices; while Li (2011) established that GSC practices contributes to the improvement of environmental performance. Further, Shang et al. (2010) discovered the existence of a positive association between GSC practices and firm performance.

Therefore, the following hypotheses were formulated to guide the study.

H_{A1}: There is significant relationship between GSC practices and waste reduction of food processing companies in Rivers State.

H_{A2}: There is significant relationship between GSC practices and decreased carbon footprint of food processing companies in Rivers State.

Methodology

This study adopted a correlational research design. The target population of the study consisted 15 registered and functional Food Processing Companies in Rivers State. The entire population was used as the sample size. 4 top management staff (procurement manager, operational manager, sales manager and logistics manager) were drawn from the 15 food processing companies to serve as respondents. The data for the study was collected using questionnaire. The Cronbach alpha was used to assess the reliability of the instrument. Descriptive statistics, such as frequency counts with simple percentage was used to analyze bio-data of the respondents, while mean score rating and standard deviation was used for univariate analysis. More so, at the inferential level of analyses,

Spearman's Rank Order Correlation was used to test the hypotheses formulated for the study. All analyses were done using the Statistical Package for Social Science (SPSS) version 22.0.

Data Analysis and Results

Table 1: Correlation Matrix of GSC practices and Measures of Environmental Sustainability

			GSC practices	Waste Reduction	Decreased Carbon Footprint
Spearman's rho	GSC Practices	Correlation Coefficient	1.000	.763**	.883**
		Sig. (2-tailed)	.	.000	.000
		N	40	40	40
	Waste reduction	Correlation Coefficient	.763**	1.000	.680**
		Sig. (2-tailed)	.000	.	.000
		N	40	40	40
	Decreased Carbon Footprint	Correlation Coefficient	.883**	.680**	1.000
		Sig. (2-tailed)	.000	.000	.
		N	40	40	40

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

Source: Research Data 2024 and SPSS Output version 23.0

The result as depicted in Table 1 reveals a strong and positive relationship between GSC practices and waste reduction of food processing companies in Rivers State. The facts indicate that GSC practices is significantly associated with waste reduction (where $\rho = .763$ and $P < 0.05$). The results suggest that GSC practices reduce waste of food processing companies in Rivers State. Hence, the alternate hypotheses is accepted.

Table 1 also reveal a very strong positive relationship between GSC practices and decreased carbon footprint of food processing companies in Rivers State. The result suggests that improvement in GSC practices will lead to decreased carbon footprint of food processing companies in Rivers State. Hence, the alternate hypothesis is accepted.

Discussion of Findings

The outcomes of the analyses on how GSC practices relate to environmental sustainability (waste and carbon footprint reduction) of food processing companies in Rivers State reveal that GSC practices has strong positive correlation with waste reduction, and very strong positive correlation between GSC practices and decreased carbon footprint of food processing companies in Rivers State. This means that increased GSC practices will result in waste reduction and decreased carbon footprint of food processing companies in Rivers State.

These findings are in tandem with the report of Ikegwuru and Akani (2020) that green purchasing; green manufacturing, green packaging, green distribution and green marketing have direct positive effect on environmental sustainability in the food industry in Rivers State of Nigeria. The findings also align with the report of Feng et al. (2018) a positive significant relationship exists between GSC practices and environmental, operational and financial performance.

Conclusion and Recommendations

Based on the findings, the study concluded that GSC practices significantly and positively relate to environmental sustainability of food processing companies in Rivers State. This implies that

GSC practices affect firm's environmental sustainability by reducing negative environmental impact, through the use of eco-friendly processes, environmental collaboration with suppliers, eco-labelled products and adoption of environmental criteria in supplier assessment.

GSC practices positively impact environmental sustainability. This suggests that implementation of GSC practices promote environmental sustainability of food processing companies in Rivers State. Through GSC practices, firms reduce administrative, transportation and aftermarket support costs, increased market share, achieve higher sustainability goals, and provide greater customer service. Based on this, the study recommends that management food processing companies in Rivers State should incorporate green initiatives in their procurement processes in order to improve their environmental sustainability in terms of waste reduction and decreased carbon footprint.

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