

RESEARCH ARTICLE



The Role of Manufacturing Organizations in the Adoption of Sustainable Supply Chain Management Practices and Performance

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Abstract

This study examined the extent of relationships for sustainable adoption of supply chain management practices and performance in Nigerian manufacturing organizations. The study looked into the factors that influence the breadth and depth of the industry's activities and presented series of constructs that identify sustainable supply chain management operating activities, the factors that act as driving environmental issues and what specific management practices exist in the selected companies. The study adopted the concept of system theory, which is key aspect of the roots of environmental management. The study also reviewed the impact of pro-active and re-active practices in the implementation of sustainable supply chain management. The survey questionnaire was used for data collection from the selected respondents. The companies were selected randomly. The survey instrument was administered using convenience sampling techniques which was deemed the most feasible approach. Factor analysis was conducted to confirm groupings of sustainable supply chain management practices and performance. Kaiser criterion was employed and the hypotheses testing done using correlation model. The results showed significant positive relationships for all the variables used for the test. The study however had some limitations for most of the respondents were reluctant to answer the questions due to cultural issues. The study concluded by indicating that to succeed in the competitive market, that companies should learn to align their supply chain with the demands of the markets they serve. The study have significant impact on the manufacturers in Nigeria and other developing countries, for they need to understand the potential positive effects sustainable supply chain practices could have on different dimensions of performance and be more proactive in the adoption of such practices.

Keywords: Sustainability, Adoption and Supply Chain-Management

1 | INTRODUCTION

As a developing country, Nigeria government has highlighted environmental issues and economic development as a priority for economic modernization, place competing demands on manufacturers to act responsibly towards the environment. In recent years, reforms have been the features of the Nigerian economy and have brought with it substantial environmental problems. Wilcoxon P.F. (1990) pointed that under competitive, regulatory and community pressure, that it has become increasingly important for organizations to balance economic and environmental issues such as establishing more strict environmental regulations, promoting greener production and encouraging ISO 14001 Certification. These issues are significant because studies have shown that majority of the world's manufacturing might be carried out in Asia (US-AEP 1999). Rao (2002) noted that the growth might create many opportunities and at the same time bring about substantial environmental burden.

The term sustainable (Green) supply chain refers to the idea of integrating sustainable environmental processes into the traditional supply chain which include the following;

- Supplier selection and purchasing material.
- Product design.
- Product manufacturing and assembly.
- Distribution and end of life management.

Instead of mitigating harmful impact on business and supply chain operations, sustainable (Green) supply chain involves value addition or value creation through the operations of whole chain. Undeniably, reducing air, water and waste pollution is the main goal of sustainable supply chain, while enhances firms performance in terms of less waste manufacturing, reuse and recycling of products, reduction in manufacturing cost, greater efficiency of assets, positive image building and greater customer satisfaction.

On the other hand, sustainable supply chain management encompasses the companies and the business

activities needed to design, make deliver and use a product or service. Most companies depend on their supply chains to provide themselves with what they need to survive and thrive. Every company fits into one or more supply chains and has a role to play in each of them. The pace of change and the uncertainty about how markets evolve made it increasingly important for companies to be aware of the supply chain they participate. The companies that learn how to build and participate in strong supply chains have substantial competitive advantage in their markets. Lambert et al (1998) defined supply chain as the alignment of firms that bring products or service to market, consists of all stages involved directly or indirectly in fulfilling customer request. Supply chain not only includes the manufacturer and suppliers, but also transporting, warehouses, retailers and customers themselves according to Chapro and Meindle (2001).

Ganesham and Harrison (1995) noted that supply chain is a network of facilities and distribution options that performs the functions of procurement of materials, transformation of these materials into intermediate and finished products and the distribution of these finished products to customer. On the other hand, the definition of supply chain management according to Mentzer et al (2001) opined as follows; “.... the systematic, strategic co-ordination of the traditional business functions and the tactics across these business functions within a particular company and across business within the supply chain for the purpose of improving the long term performance of the individual companies and their supply chain as a whole”.

Generally, we define supply chain management as the co-ordination of production, inventory, location and transportation among the participants in a supply

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chain to achieve the best mix of responsiveness and efficiency for the market being served.

In essence, supply chain management acknowledges all of traditional logistics which include such activities like marketing, new product development, finance and customer service. Effective supply chain management requires simultaneous improvements in both customer service levels and the internal operating efficiencies of the companies in the supply chain. The goal or mission of supply chain management is to increase throughput while simultaneously reduce inventory and operating expense. Through put refers to the rate at which sales to the end customer occur.

2 | OBJECTIVES OF THE STUDY

The main objective of the study was to examine whether adopting environmental measures worth the effort of the Nigerian organizations in terms of economic and environmental performance. In essence to provide guidance in what practices could be worthwhile to adopt and the relationship between supply chain management practices and performance. Other specific objectives include to assess whether the manufacturing organizations in Nigeria enhance environmental sustainability for the purposes of improving environmental performance. The essence of environmental sustainability effort might ultimately translate into improved market share and profitability. Preuss (2002) argued that need for integrating environmental issues into the mainstream of supply chain management, while Handfield et al (1997) suggested that environmental sustainability efforts be integrated throughout the value chain. Linton et al (2007) asserted that the focus of environmental management moved from the organizational level of the supply chain level.

In this study, we proposed that Nigerian manufacturing organizations should adopt environmental sustainability as a strategic imperative and expand existing enterprise information system capabilities to monitor environmental issues. Furthermore, we proposed that successful implementation of sustainable supply chain management (SSCM) practices such as sustainable purchasing, co-operation of customers,

eco-design and investment recovery might lead to improved environmental and economic performance which support improved operational and organizational performance.

Research Questions:

Based on the objectives of the study, the following research questions were proposed to guide the study:

- To what extent and nature of sustenance is the supply chain utilized in the Nigerian manufacturing organizations?
- What factors influence the breadth and depth of sustenance in the Nigerian manufacturing companies?

Research Hypothesis:

The following research hypotheses were formulated to guide the study:

- (1) Ho: Companies with higher levels of adoption capability of sustainable supply chain management practices have better environmental performance improvement.
- (2) Ho: Companies with higher levels of adoption of sustainable supply chain management practices have significant positive economic performance improvement.

Environmental performance is a concern of business managers due to reasons ranging from regulatory and contractual compliance to public perception and competitive advantage (Theyel, 2001). The relationship between SSCM practices and environmental performance is needed especially for companies that need to balance a growing economy and environmental protection such as Nigeria.

On the other hand, economic performance is the most important driver for companies that wish to implement environmental management practices. Hansmann and Kroger (2001) argued that success in addressing environmental issues provide new opportunities for competition and new ways to add value to core business programs. Bowen et al (2001) suggested that economic performance is clearly not being reaped in short-term profitability and sales performance, evidence to suggest that proactive SSCM

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approaches prepares companies to superior long-term performance through improved management of environmental risks and the development of capabilities for continuous environmental improvement.

Extant literatures like Porter and Van der Linder (1995). Shrivastava (1995) attributed a number of benefits for the integration of environmental issues such as;

- Cost savings and improvements in companies' efficiencies.
- Product quality improvements.
- Increases in market share.
- Getting ahead of competitors and legislation.
- Access to new market.
- Enhances employee motivation and satisfaction, improvement in public relations and access to financial aid.

Literature Review and Theoretical Framework:

Sustainable supply chain management concept occurs to mitigate environmental degradations, control air, water and waste pollutions through the adoption of sustainable practices in business operations. Undeniably, the basic ideology behind sustainable concept is to enhance environmental sustainability. In this section of the study, we review the literature on sustainable supply chain management (SSCM) in order to identify the gaps between theory and practice and then develop a framework for the roadmap for sustainable supply chain management. Mentzer et al (2001) defined supply chain management as the systemic, strategic co-ordination of the traditional business function and the tactics across these business functions within a particular company and across business within the supply chain for the purposes of improving the long-term performances of the individual companies and the supply chain as a whole. Lambert et al (1998) referred SCM to the integration of key business processes from end user through original suppliers that provides products, services and information that add value for customers and other stakeholders.

Green et al (2008) noted that supply chain management requires the integration and co-ordination of business and co-ordination of business processes and strategy alignment throughout the supply chain for the purpose of satisfying the final customer of the supply chain. Business processes that should be integrated and co-ordinated include, purchasing, manufacturing, marketing, logistics and information systems. Murry (2000) noted that many manufacturing organizations have begun to implement SSCM practices in response to customer demand for products and services that are environmentally sustainable. These practices require the manufacturers work in concert with suppliers and customers to enhance environmental sustainability. The implementation of SSCM practices are expected to result in improved environmental performance as measured by reductions in the emission, effluent waste, solid waste and the consumption of toxic materials. Seuring (2004) described environmental supply chain management as the managerial integration of material and information flow throughout the supply chain to satisfy the demand of customers for green products and services produced by green processes. Vachon et al (2006) noted that supply chain strive to maintain internal health and environmental sustainability using the capability to self correct based on information from the external environment.

Seuring (2001) cautioned that transaction costs associated with interactions among supply chain partners should be considered as the partners work to improve the environmental sustainability of the supply chain. Handfield and Nichols (1999) provided the following definition for a supply chain;

“.... Supply chain encompasses all activities associated with the flow and transformation of goods from raw materials through the end user as well as associated information flow, material flow both up and down the supply chain”.

In this description, the supply chain is considered to be a linear process. In other words, supply chain management is the handling of the entire production flow of goods and services, starting from the raw components all the way to delivering the final product to the consumer. To accomplish this task, a company create network of suppliers that move the

product along from the suppliers of raw materials to the organizations who deal directly with users. In essence, effective supply chain management minimizes cost, waste and time in the production cycle, create competitive advantage in terms of greater customer satisfaction, positive image/reputation and provide better opportunities to export their products in pro-environmental countries.

Notwithstanding, many researchers have attempted to produce a unified definition by systematically examining collections of definitions. In spite of their efforts, there is no clear consensus as to the definition of supply chain management. For the purpose of this study, we adopted the following definition presented by Lambert et al (1998), defined supply chain management as;

“... the integration of key business processes from end-user through original suppliers that provide products, services and information that add value for customers and other stakeholders.”

We also adopted the concept of system theory for the adoption of sustainable supply chain management in Nigerian manufacturing organizations. The system theory is a key aspect of the philosophical and conceptual roots of environmental management. Kumar and Putman (2008) opined the importance in the adoption of sustainable (green) practices due to its effect on institutional pressures driven by market and regulatory demands. Other studies such as Zhu and Sarkis (2004), Raw and Holt (2005) and Green et al (2002) found positive relationships between environmental practices and organizational performance. Other studies such as Huang et al (2012) found that there exist no significant relationships in supply chain management practices and organizational performance.

Framework for Sustainable Supply Chain Management Practices:

In this section of the study, we examined the impact of both pro-active and re-active practices in the implementation of sustainable supply chain management practices. The framework is shown below in Figure 1:

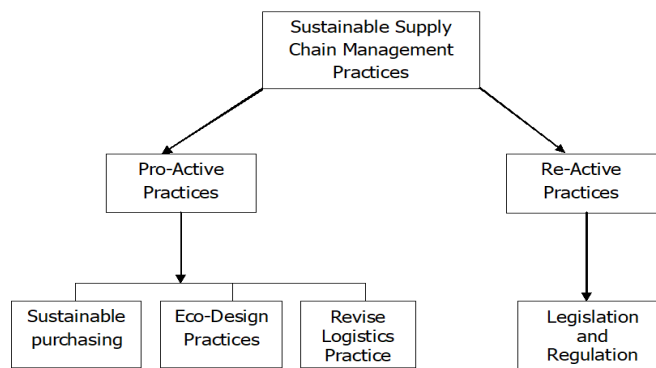


FIGURE 1: Framework for SSCM Practices

Source: Adopted from various Literature Review with modification

The pro-active practices include sustainable purchasing, eco-design practices and reverse logistics practices, while the re-active practice include legislation and regulation. Sustainable purchasing practice is one of the commonly accepted dimensions of SSCM practice.

Lee (2008) noted that a buying organization with a sustainable supply chain initiative pay attention to sustainable practices to ensure that suppliers meet their environmental objectives. Buyukozkan and Cifci (2012) identified the importance of eco-design and noted that about 80% of product related impacts on the environment were influenced during eco-design. Likewise, they recognized the strategic importance of reverse logistics could provide lucrative economic benefits and improve organizational competitiveness. On the issue of legislation and regulatory practices, Chen and Sheu (2009) suggested that relevant public policies were central to substantiating the sustenance of the supply chain, while Murry (2000) noted that many organizations have made efforts to accelerate the sustenance of their supply chain in response to stringent legislation and regulation.

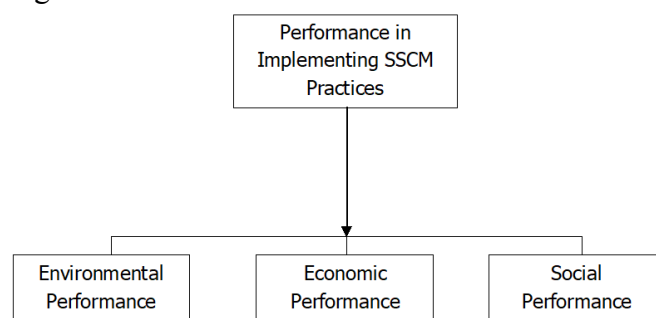


FIGURE 2: Framework for Measuring Performance in Implementing SSCM

Source: 'Adopted from Various Literature' Review with modification

Zailam et al (2012) measured social performance in terms of product image and company image with customers and community stakeholders. In addition, the study measured economic performance in terms of reduced cost and increased profitability and environmental performance measured in terms of reduction in an emission, energy consumption, hazardous materials, material usage and compliance to environmental standards.

On the basis of the above framework, this study examined the relationship between sustainable practices and organizational performance within the context of adoption of sustainable supply chain management in Nigeria manufacturing organizations.

3 | METHODOLOGY:

The research framework in this study was developed to examine the relationships between sustainable supply chain management practices and organizational performance as shown in figure 3.

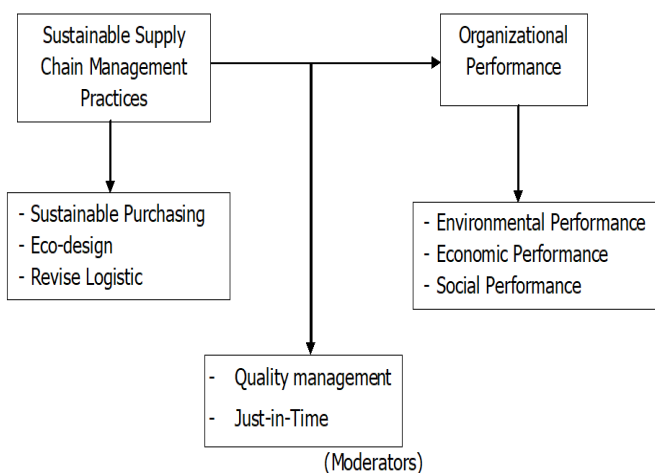


FIGURE 3: Research Framework

Source: Adopted from Zhu and Cote (2002) with modification.

This section of the study provided the methodology for operationalizing the variables and factors, acquiring the data and determining the reliability of factor groupings. Convenience sampling technique

was used to select the samples for the study. Data were collected using a survey instrument designed to identify the SSCM practices and several steps were taken to ensure validity. First, prior studies were used to improve the validity of the research instrument. Second, the questionnaire was sent to environmental experts for perusal and comments. The questionnaire was modified to reflect the feedback received. Third, the modified questionnaire was piloted using sample of another companies to assess the structure, length and appropriateness of the questions used. There were a total of 285 usable responses from the selected manufacturing companies with a response rate of 89%.

4 | DATA ANALYSIS:

Data were collected from a sample of randomly selected respondents totaled 285 employees of different manufacturing companies located in Lagos State, Nigeria. Factors analysis was used to examine the construct validity while multivariate linear regression model was used to test the criteria validity. To reduce the number of constructs, a principal components analysis (PCA) was performed for each group of constructs, measuring each type of driver to establish how many dimensions these constructs measure. As mentioned above, the survey instrument was administered using convenience sampling technique which was deemed the most feasible approach. Out of a total of 320 questions administered to all the selected employees of the manufacturing companies, a total number of 285 unique and usable responses (89%) were perfectly filled and returned back to the researcher. Factor analysis was conducted to confirm groups of SSCM practice and performance.

From the survey data, factors were extracted using the maximum likelihood method followed by a varimax rotation. The Kaiser criteria (eigenvalues ≥ 1) was employed in conjunction with as evaluation of scree plots. Both the scree test and initial eigenvalue test suggested the presence of four meaningful factors for practice and performance respectively.

Hypotheses Testing:

A bivariate correlation model was used to test the study's hypotheses. The results showed that there

exist positive significant relationships between sustainable supply chain management practices and performance as stated in the hypotheses.

In addition, the findings from the study clearly showed the importance of legislation and regulation to sustainable supply chain management implementation by the manufacturers. The fear of legislation associated with compliance with environmental standards and regulations were clearly the most important driver of practice and performance.

TABLE 1: Bivariate Correlation Analysis Results

Variables	1	2	3	4	5	6
Practices:						
Internal Management	1.00					
External Supply Chain Management	0.753**	1.00				
Legislation and Regulation	0.648**	0.674**	1.00			
Eco-Design	0.582**	0.546**	0.527**	1.00		
Performance:						
Environmental	0.563**	0.482**	0.476**	0.468**	1.00	
Economic	0.542**	0.521	0.486**	0.436**	0.418	1.00

Most of the results showed a significant relationships. The direct relationships between the SSCM practices seem to be doing what was expected of them in terms of positive environmental performance. The economic performance was a plus. The expectations of management in these organizations that win-win opportunities play a significant role in lessening the barrier of SSCM practice adoption.

Our empirical results showed that eco-design had direct positive effects. Eco-design finding was helpful, energizing as a tool to improve companies environmental performance by addressing product functionality while simultaneously minimizing life cycle environmental impacts. The internal management practices have the largest impact on both environmental and economic performance respectively with eco-design with moderate impact.

Contribution to Knowledge:

Sustainable supply chain management emerged as a set of management practices that integrate environmental issues into supply chain management practices and performance. Nigeria manufacturing organizations could benefit from this study by gaining knowledge about what types of sustainable supply chain management practices could provide the most benefits in terms of different performance dimensions.

In addition, the study has implications for policymakers and regulators regarding how to provide environmentally friendly activities among manufacturing, trading and logistics firms. In essence, if SSCM is implemented properly, it could be a way to achieve competitive advantage while enhancing the environmental sustainability of the company.

Future Study:

The ultimate aim of sustainable supply chain management is to improve the environmental performance of the supply chain and industry as a whole. Future study should examine the moderating influence of nationality of present firms and the moderating influence of the in-coming location, and should incorporate the dimension of risk. However, mechanisms need to be developed to provide comparable designations rather than those self selected or a way to triangulate these self designated measures.

The study used relatively small manufacturing sample and should be replicated in a large group, and should seek to validate the influence of potential environmental risk and impact by using universal measures that allow direct comparability. This study may not be very accurate, therefore, considering risk factors and environmental impact, we suggest the use of moderating factors may be a fruitful aspect to explore. The moderating factors might provide a more useful classification for producing environmental activity than sector or size as these measures might be very difficult to analyze. However, we are aware that supply chain management is an integral part of most businesses and very essential for company's success and customer satisfaction.

5 | CONCLUSION:

To succeed in the competitive markets in today's economy, companies should learn to align their supply chains with the demands of the markets they serve. The emergence of sustainable supply chain management has an important new archetype for companies to achieve profit and gain greater market share. Nigerian manufacturing organizations need to change their focus from single plant improvement to the whole supply chains. From literature review, the adoption of sustainable supply chain management in Nigeria manufacturing organization is still at its early stages of development. However, some companies have recognized the importance and have attempted to implement some of the principles and guidelines as a necessary tools and management skills. The study generally examined the relationship between sustainable adoption with regard to practice and performance and the study shown significant positive relationship. This study could be replicated elsewhere that take advantage of the availability of strategic issues to achieve ultimate performance. We encourage future researchers to use larger sample sizes may be helpful to truly determine moderating effects. Notwithstanding, this study has provided insight into the growing field of the relationships between environmental and operational practices and performance. At the present time, environmental issues have been increasing and moving faster than forest fire and has become a serious issues on climate change and global warming. This study has shown that sustainable supply chain management occurs to mitigate environmental degradations, control air, water and waste pollution through the adoption of sustainable practices in business operations. Undeniably, the basic ideology behind sustainable concept is to enhance environmental sustainability.

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