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(RESEARCH ARTICLE)



Sustainable supply chain management: The right way of doing business in Nigeria

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Abstract

Background: Improved organizational performances and increased competitiveness have been linked to sustainable supply chain management as a strategic tool. In Nigeria, most manufacturing companies seems to be unaware of the importance of this tool in their supply chain processes. Some of their manufacturing outputs are threats to life's existence. Proper adoption of all sustainable practices will not only reduce the cost of production but will also increase business profitability.

Purpose: The main objective of this study is to investigate guidelines or practices manufacturing companies in Nigeria must adopt to achieve sustainability in their supply chain management. In addition, to explore the relationship between the outcomes of sustainable supply chain management practices and business profitability among manufacturing firms in Nigeria.

Methodology: The research design is a descriptive type. Data was collected using a structured questionnaire that was designed to address each of the research questions.

Findings: The findings are presented in tables. It was shown that the general awareness of sustainable practices is a bit above average and the adoption of the practices was seen in varying degrees. Reverse logistics (37%), sustainable warehousing (75%), environmental purchasing (26%) sustainable transportation (4%).

Discussions: Adoption of these sustainable practices has been seen to increase sales, improve the corporate image of the firm, and improve information sharing among all stakeholders. However, this adoption is still poor, which means that the manufacturing sector has yet to harness the concept of sustainability as an option for doing business right in the country.

Keywords: Sustainability; Profitability; Sustainable practices; Supply chain optimization; Environmental Impacts

1 Introduction

There is a growing concern that today's supply chain is defective. Many manufacturing companies generate waste and pollution that are harmful to people and the environment at the expense of making a profit (Carter and Jennings, 2002). As the awareness about climate change effects is increasing, simply claiming, "we are sustainable" by companies or by putting sustainability logos on products and websites is not enough anymore. Becoming more aware of the environmental, social, and economic impact on the supply chain and customers' consciousness is increasing as companies move towards a sustainable future. The drive for this change is unlikely to be from Government pressures, but pressure among organizations to their vendors and suppliers.

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In recent times, many manufacturing companies are struggling to operate in a sustainable manner. It is very obvious that going green and environmentally friendly is the sure way to the future (Carter and Jennings, 2002). For this to be possible, companies are making products and delivering the same to the end users in such a way that will not impact negatively the environment, and engage in activities that do not deplete natural resources thereby adding to climate change and creating social equity among workers in their companies. One of the ways all these can be achieved is by focusing more on the whole value creation process (from sourcing raw materials to delivery to the end users).

It is not enough to focus on the environmental impact alone, other aspects such as the social and economic impacts are also very critical. For instance, if a company is sourcing its raw materials from child labor in a third-world country, and the organization is making a profit through it irrespective of the company size and profit, it is not a sustainable business. One way to run a sustainable business is through the supply chain. Who are the suppliers of your raw materials? What are their sources? And under what conditions are your products produced?

The concept of sustainable supply chain management has grown over the years both in books and in practice. It has become of significant strategic importance to manufacturing companies. Sustainable development is a concept that gives a structure to the efficient use of available resources, protects the quality of life, and increases profitability in business without tampering with the environment (Chung, 2005). In Nigeria, most manufacturing companies seems to be unaware of the importance of sustainability in their supply chain processes as some of their manufacturing outputs (such as waste and pollution) are threats to life existence. Pressure from different stakeholders has pushed the supply chain managers to start integrating this concept into their supply chain processes. Hence, there is an urgent need for manufacturing companies to design a system that protects and considers the impact of environmental influence while still doing their business.

Supply chains is the network of systems that links the inputs and the outputs of a company together. It connects the suppliers with the consumers. It is therefore impossible to talk about sustainability when the suppliers (i.e those that provide the raw materials and transport services) are not operating in a sustainable manner. According to Handfield and Nichols, (1999), optimization along all the cascade of steps that are involve in production of an output (products and services) will be of great value provided they are done at a reduced cost possible. In most cases, this submission has pushed many organizations to change from sub-optimally cost-driven business to creating the best possible value for all the stakeholders across the entire supply chain (Leenders & Blenkhorn, 1988).

Globally, statistics have shown that about 2,500 companies contribute more than 20% to greenhouse gas emissions, the statistics also reveal that the supply chain departments of these companies contribute junk to this emission. (Carbon disclosure, 2011). Until recently, most companies that are involve in logistics and supply chains have been handling the relationship their business has with the planet, safety, and human rights as a standalone policy without considering their inter-relationships (Carter and Jennings, 2002). If activities such as reduction in waste, cost of packaging reduction, improvement welfare for warehouse workers, use of eco-friendly transportation, and intellectual engagement of suppliers on environmental and social programs are incorporated into an organization's processes, it will not only reduce cost, it will also improve corporate reputation.

Most multinational companies now see the need to incorporate sustainability into their supply chain management and not just an optional idea as it was before. On second thought, to what extent can an organization practice sustainability when their suppliers of raw materials, transport providers, component providers etc are not?

2 Literature review

2.1 Sustainability as a concept

The frequent use of the word “Sustainability” in the recent times shows clearly its prime position as regards processes in virtually all sectors. According to the submission by the President’s Council on Sustainable Development in 1996, this concept seems to be taking the center stage in strategic decisions by different policy makers. Similarly, Anon, (2001) also, corroborated the fact that sustainability is well published in the media and also in some technical journals across several fields. A Google search was done on the frequent use of sustainability across different fields. Fig 1 describes its interdisciplinary nature.

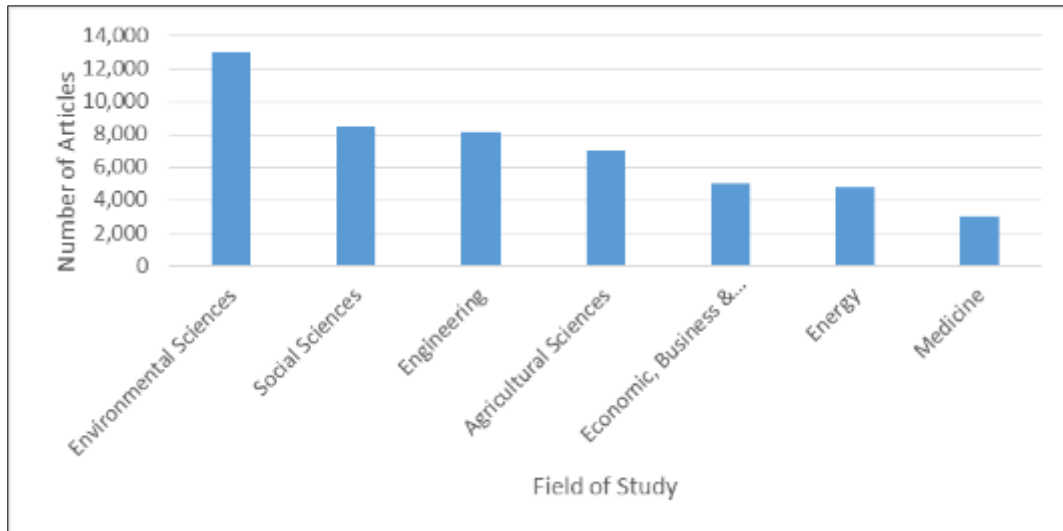


Figure 1 Interdisciplinary Use of Sustainability

Several authors have defined sustainability in their different published articles. However, the most quoted has been that of the World Commission on Environmental Development in 1987, which defines sustainability as the tendency of meeting up with the present needs based on the available resources without affecting the ability of future to meet up with their own needs. Due to the broadness of this definition, most organizations often find it difficult to discover their place and role in the whole process, hence, implementation becomes difficult. Also, from a macroeconomic point of view, Starik and Rands (1995) defined it as “the ability of an entity to exist or flourish for a long time in such a way that the existence of other entities, collectively is allowed”. From an operational management point of view, Sharisvatava (1995) defined sustainability as “the ability to lower long-term risks resources associated with the reduction potential, pollution, waste management and product liabilities” Sikdar, (2003) also defined it from an engineering point of view as the ability of an organization to strike an equilibrium among social equity, environment and economic development. This definition seems to be deeper and encompassing, it accommodates the three pillars that are very important whenever we talk about sustainability which are the economy, the environment, and the people. This is also called triple bottom lines, it is an idea developed by Elkington, (1998) see Fig 2. It describes the equilibrium among the economic performance, environmental performance, and social people performance.

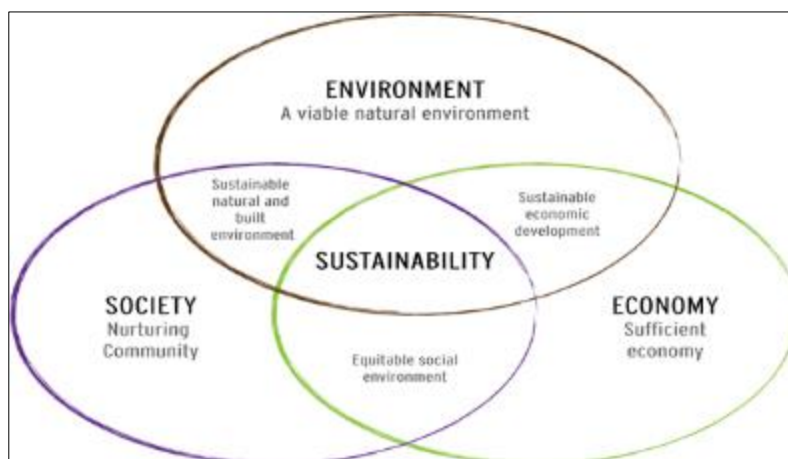


Figure 2 The triple bottom lines

To buttress Sikdar’s point of view, in 2010, Tueteberg and Wittstruck proposed a concept they called the “House of Sustainable Supply Chain” as seen in Fig 3 below. This further explains the fact that for supply chain management to be sustainable, it has to be built on the three pillars of sustainability. As seen on the diagram, while there will always be risk attacks from the Environmental and market aspects, the house could withstand them because of the foundation which is made up of risk and compliance management.

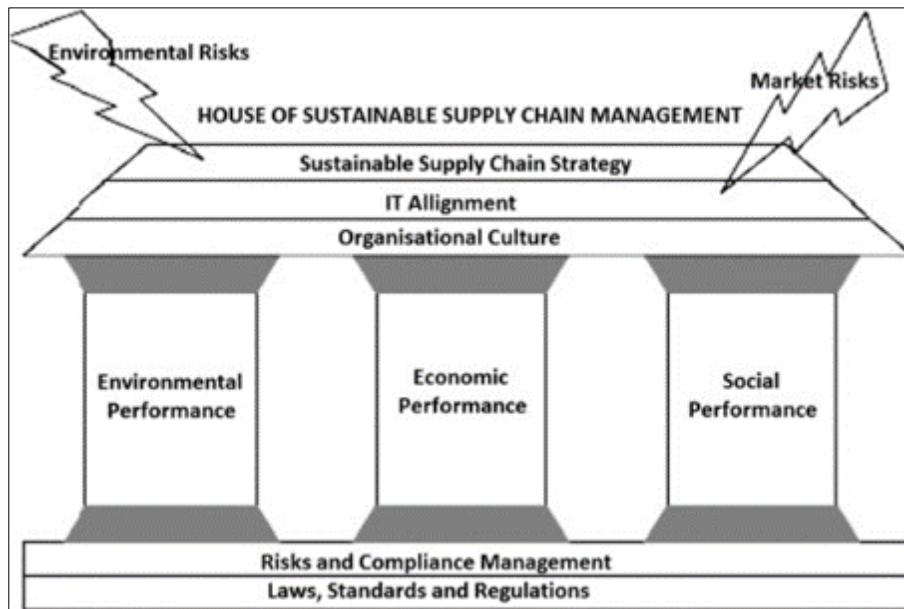


Figure 3 House of Sustainable supply chain

Although there are different views as regards the definition of sustainability, the important point is that all of them point towards environmental Impact, economic performance, and social equity. This is not so strange, according to Kuhn (1996), whenever a new concept is emerging, divergence of views cannot be overemphasized.

2.2 Supply Chain Management

In recent times, more attention has been drawn to the processes involved in delivering services to customers as crucial to the growth of any organization. These processes are what it takes to source a product's raw materials, manufacture it, and deliver the same to the customers which are the end users. Supply chains are the link that connects all these processes, it provide a system design that enhances the continuous delivery of value to customers.

According to Mentzel et al (2002), supply chain management is defined as the elemental and strategic coordination of business functions across all the unit in an organization, with the ultimate goal of improving customer's satisfaction and corporate reputation weather in short term or long term. In the same vein, another author also defines it as "the incorporation of important processes into customer's satisfaction through the original suppliers that made available products and services" (Lambert et al, 2006). Based on these well-documented and prominent definitions, it is obvious that every serious organization should not play around with their supply chain management, because customers are increasingly yearning for the delivery of products and services at a lower cost, hence, the new competitive advantage is for organizations to think out ways to achieve this.

In recent times, economic trends and globalization have made supply chain operations more complex and as a result, the structures, organization, competencies, and management have become critical issues (Faruk et al, 2001).

2.3 Sustainable Supply Chain Management

Supply chain management by several organizations has responded differently to the interconnectivity of frequent changes in product prices and climate change. In recent times, there have been a lot of disapprovals about "business as usual". To what extent do organizations enforce or implement sustainability practices in their day to day operations? Initially, this was resisted by some organizations, however, some have embraced it and started to become sustainable in their supply chain management operations.

Seuring and Müller (2008) defined sustainable supply chain management as the integration of properly managed materials, information and capital flows within their supply chains while still focusing on the three dimension of sustainable development which includes economy, social and the environment. Though there have been a series of related published works, however, this definition of sustainable supply chain management is said to be the standard definition and the first (Mentzel et al, 2002) For organizations to be competitive in meeting their customer's needs and economic priorities, it is expected that the environmental and social criteria are been achieved by all stakeholders.

In the same vein, Craig and Dale (2008) defined sustainable supply chain management as the systemic coordination of different business units through the integration of transparent and strategic sustainable development goals (i.e. environmental, social, and economic) towards the long-term performance of the whole organization.

For supply chain management to be sustainable, it must incorporate the three bottom lines of sustainability (Sikdar, 2002; Tueteberg and Wittstruck, 2010). Organizations vary in their approach to sustainable supply chain management, while some are putting emphasis on the environmental aspect others are prioritizing the social aspect. Sustainable supply chain management accommodates series of concepts such as environmental, in which organizations focuses on the reduction of negative environmental impact while carrying out their business processes. It also incorporates the social aspect in which organizations focus on their supplier's sources of raw materials. The third aspect is the economy, this includes patronizing local suppliers to encourage local content and financial regeneration.

2.4 Sustainable Supply Chain Management Practices

According to the opinion of Zhu et al, (2004), a sustainable supply chain require some certain practices such as environmental purchasing, sustainable transportation, sustainable warehousing, sustainable packaging, reverse logistics etc. These practices are the collective responsibility of all the stakeholders for effective sustainable supply chain management. Carter and Jennings (2002) from their research, explained that sustainable warehousing involves activities such as good location for warehouses, good storing conditions, proper disposal of wastes. James et al (2005) defined sustainable packaging as one that adds value to life, products well packaged to avoid destruction along the supply chain process and materials used for the packaging are made up of materials that can be recycled without posing any threat to human health. In the opinion of De Brito (2003), considered another sustainable supply chain management practice as reverse logistics and defined it as the process involved in using raw materials that can be reused in product manufacturing.

According to empirical research done on Italian companies by Ciliberti et al. (2007), on the extent to which they adopt sustainable supply chain practices, they found that 56% practices Environmental purchasing, 20% practices Sustainable transportation, 17% practices Reverse logistics while just 1% practices Sustainable warehousing. Obviously, there is a need for organizations to strike a balance. The more companies move towards sustainability in their supply chain management, the more they are likely to experience competitive advantage and improvement in business profitability.

2.5 Outcome of sustainable supply chain management practices

The pattern in today's business world coupled with the high demand by stakeholders in accessing sustainable products, has pushed many organizations to implement strategies that reduce environmental impact in their production processes (Liz and Green, 2012). Organizations can get competitive advantage easily by the adoption and implementation of environmental strategies (Vachon and Klassen, 2007).

According to Salah and Faisal (2015), the effect of sustainable supply chain management practices has both academic and managerial implications. In their publication, they further submitted that there were three significant impacts supply chain management practices has over business: (1) Financial performances, these include reduction in cost of materials for purchasing, wastes management and energy consumption. (2) Environmental performances, these include reduction in environmental accidents and reduction of air and water pollution. (3) Operational performances, these include improvement on lead-time for delivery, increase in product quality and reduced inventory.

In a similar publication, Catherine and George (2016) believed that the outcome of sustainable supply chain management in an organization depends on a particular aspect of the practice they are adopting. Before any organization will experience sustainable supply chain management, they must first adopt it as part of their long-term strategic objective, most importantly, the top management must incorporate it as the company mission statement thereby cascading the enforcement and implementation down to all their processes. The study also found that any organization adopting sustainable supply chain management practices tends to experience an increase in their overall business profitability. First of all, it increases their competitiveness, customers are more attracted to their products (i.e. increased market share), and ultimately translates to increased profits, sales and customer satisfaction (Catherine and George, 2016).

Adoption of sustainable supply chain management practices is an interesting one in addressing the problem of carbon emission and environmental pollution, organizations will not only reduce the carbon footprint, they will also improve their supply chain processes. Nigeria as a developing country has to work out ways to balance both its operational and environmental performances. Anecdotal studies show that the adoption of these practices among Nigerian firms is still

very low as the majority of them are more concerned about their business profitability at the expense of negative environmental impact.

2.6 Challenges in adopting sustainable supply chain management practices by Nigerian manufacturing companies

As previously cited, sustainable supply chain management can be summarily defined as incorporating environmental thinking into supply chain management. However, the outcomes and impacts in adopting these practices are well researched and published in books, their implementation in reality seems poor especially among manufacturing companies in Nigeria.

According to Faruk et al (2001), they identified the following as the barriers to adopting sustainable supply chain management practices among construction companies in Nigeria; lack of public awareness, lack of knowledge about environmental impacts, poor commitment by top management, lack of legal enforcement by government, absence of sustainability in mission and vision statement of companies, poor information sharing among all the stakeholders. This is further displayed in order of hierarchy in the diagram below. These barriers were known to be the same in all other sectors, except for some few peculiar factors that are specific for the sector in question. Faruk et al (2001).

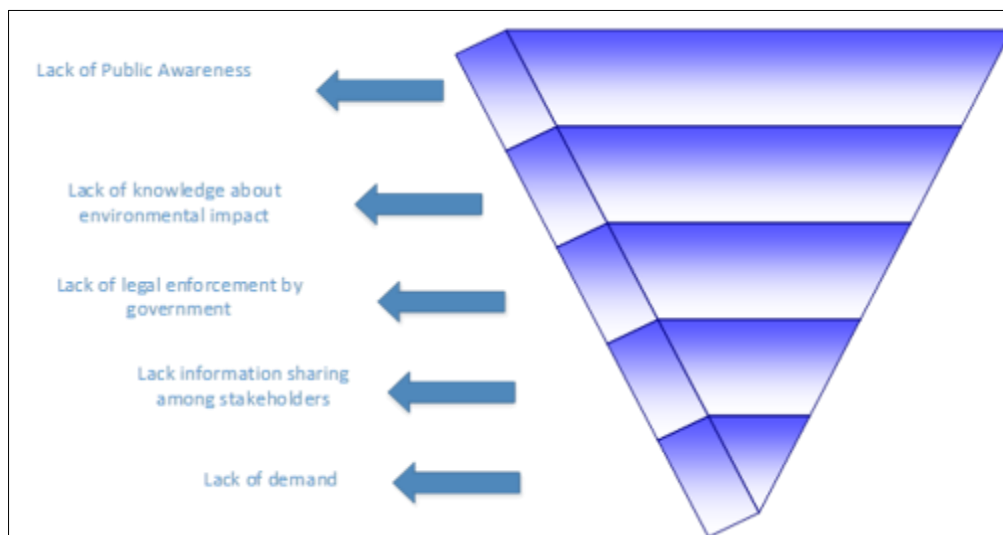


Figure Hierarchy Model of green supply chain management barriers in the construction Industry

Gupta, (1995) listed in his publication the following barriers to sustainable supply chain management practices adoption; lack of management structures, poor social drive, high cost of green products, low management and technical capacity.

In another view by Ferguson et al (2003), these obstacles can be divided into internal and external obstacles as displayed in the chart below.

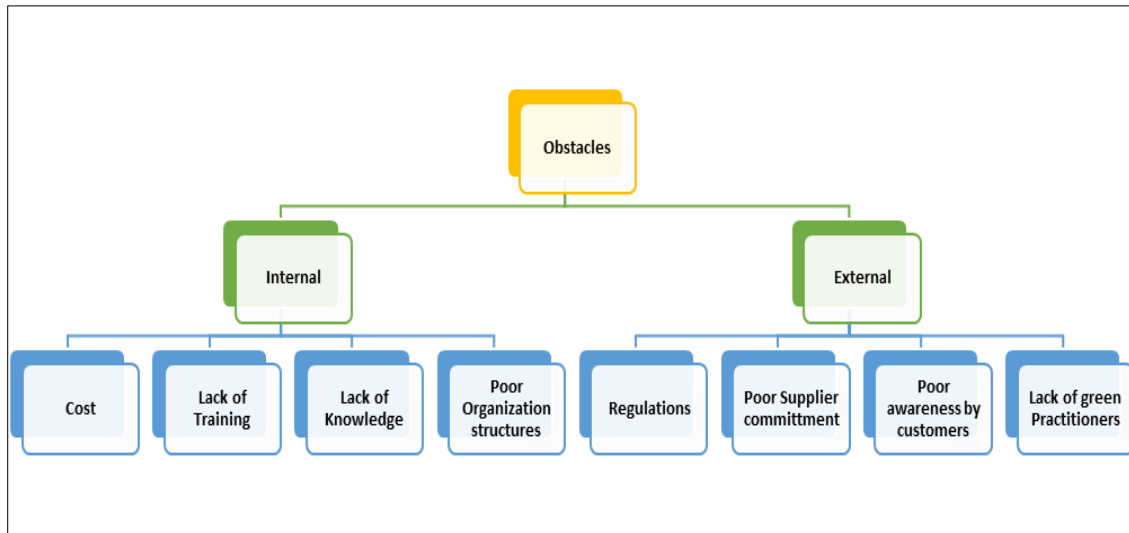


Figure Green supply chain management obstacles

3 Methodology

3.1 Research Strategy

There are two main types of research methods: Quantitative and Qualitative methods. In a quantitative method, the researcher is the determinant, he asks the respondents close-ended questions, objectively collects quantifiable data, gathers the responses, and analyzes. In a qualitative method, the researcher depends on the opinions and views of the respondents, asks open-ended questions, and collects information mainly in text form in a subjective manner.

Quantitative method of research is use to get opinions of participants; quantify the thoughts and summaries the results from a larger population. It uses data that can be measured to predict the pattern of the entire population through a sample population. Data collected through quantitative methods are better structured than qualitative methods. The quantitative research method is subdivided into inferential, experimental and simulation research approach. Inferential approach to research is the type that form a database of a sample population and infer the characteristic of the larger population. A good example of this is survey research, it observes and studies a sample population and concludes that the sample population has the same characteristics as the entire population. An experimental approach is the type used in environmental research, in which a variable is adjust in one specimen to observe the effect on the other. Simulation approach is the type involve in setting up an artificial environment to generate information (Saunders, 2009). "Simulation" within the context of business can be defined as the study of numerical data to understand or gain more insight into the mechanism of an established process. There are different survey research forms of quantitative research methods, these include; online surveys, paper surveys, face-to-face surveys, interviews and telephone surveys. Survey research gives opportunity to researcher to collect data from a sizeable number of population which can be analyze (Saunders, 2009). According to Schwarz et al, (1998), survey method is believe to be the most effective way in stimulating data from respondents.

The qualitative research method is mainly explorative research. This form of research is largely dependent on the researcher's belief and views. Data generated through this form of research are not quantifiable because they are mostly done through group discussion, individual interviews, observations and participation. In other words, it is a type of method used to get an in-depth understanding and information about participants' motivation, opinions and views about an issue. Data gathering is either unstructured or semi-structured. (Saunders, 2009). The qualitative method of research will not be suitable for this type of study because the impression and insights of the researcher will not be sufficient to answer the research questions as stated earlier.

Therefore, with the objectives of this study, the quantitative method rather than the qualitative method would be appropriate for this study. In the same light, survey research type of quantitative methods will be the best option to answer all the research questions of the study.

In this study, a structured questionnaire was designed with each section addressing each of the research questions as listed in chapter one. The questionnaires were distributed electronically to the top management staff especially those in the supply chain department from different manufacturing sectors. Electronic means were chosen so as to give the respondents room to fill their responses without the pressure of face-to-face interviews.

3.2 Study population

Sampling is very important in any research. It is the selection of a fragment of a population to determine the characteristics of the whole population. There are two main advantages of research sampling; one is cost reduction and the second is time reduction in data collection and analysis. Similarly, Karan, (2016) also defined study population as the aggregate of all subjects that conform to a specific population.

Furthermore, the sampling method is divided mainly into two; probability and non-probability method. Probability method is further subdivided into random, stratified and cluster, while Non-probability method is subdivided into judgement sampling, quota sampling and convenience sampling. In this study, stratified method of sampling was used considering the broadness of manufacturing sector in Nigeria which is mainly group into five sectors; oil refining, Food Beverages and Tobacco, Pharmaceuticals, Textiles and Furniture (wood and wood products). This stratified sampling method was used because it has an advantage as regards administrative convenience, which enhances the focus of each stratum of sectors. In addition, this method helps to further divide a heterogeneous population into homogenous strata for easy sampling. At least five companies that are directly related to supply chain management were selected from each of the sectors through a simple random sampling making a total number of 25 respondents for the study. Simple random sampling was used because of its simplicity in application and sound mathematical basis when analyzing data.

This study has adopted a quantitative research methodology. Having the understanding that this method entails the gathering of information from different respondent by sharing their diverse view about the research questions of the study. In line with the objectives of this study, this approach is the best method to use, this is because according to Karan (2016), “the main focus of the quantitative method is to underscore the objectivity of the sample population and therefore searches for responses that are generalized”. As a result, I was able to stimulate a lot of information based on the responses from the sample population to form the basis for the objective of this study.

My decision to focus on the manufacturing sector was based on the submission of Yin (2009) that doing a realistic analysis of a subject matter will help to examine the core fundamental structure and reasons. More so, this is a sector I have spent over a decade working, so I have ample knowledge about how it works in the country. I was able to establish the level of adoption of sustainable supply chain management practices by the manufacturing companies in Nigeria towards improving profitability in their ways of doing business.

3.3 Research design

This research is a descriptive type of research. It describes the level of awareness of sustainable supply chain management practices among different manufacturing organizations in Nigeria and also shows the outcomes of the adoption of these practices on business profitability. The study also describes some challenges manufacturing organizations are facing in adopting sustainable supply chain management practices. According to Tashakkori and Teddlie, (2003), research designs can come in different ways ranging from qualitative to quantitative and mixed research. In most research, both qualitative and quantitative methods are commonly used even though their mode of gathering data is significantly different. Numerical data are use in quantitative research, non-numerical data are use in qualitative research while mixed research is a combination of both qualitative and quantitative methods (Saunders et al., 2009).

This study used a quantitative method for data collection. It was a structured questionnaire that was used (see Appendix II). The questionnaire was titled “Sustainable Supply Chain Management: the right way of doing business”. It was divided into four (4) different sections (A, B, C and D) based on the research questions of the study. Section A (with sub-questions 1-5) addresses research question 1 which talks about the general awareness and impact of sustainability on supply chain performance. Section B (with sub-questions 1-9) addresses the adoption of sustainable supply chain management practices among manufacturing companies. Section C (with sub-questions 1-6) addresses research question 3, which talk about the outcomes of sustainability practices on business profitability. Section D (with sub-questions 1- 5) addresses the research question 4 which talk about some challenges or difficulty faced by manufacturing organizations in adopting sustainable supply chain management practices in Nigeria. All the questions in the questionnaire are closed-ended type for easy response, collation, and interpretation. In addition, the Likert scale model was used while the questionnaires were sent and received through email.

3.4 Research administration

As pointed out earlier, survey methods can be through different means, online survey, telephone survey, paper survey etc. In this study, telephone survey was not used for obvious reasons; it is very expensive, and it might cause interruptions in the busy schedules of those top managers to be interviewed. Electronic means of administration were adopted for the research instrument (questionnaires). Questionnaires are tools given to respondents to express their thought either by writing or by choosing among any of the options given to them. It can be a printout paper or an online form. This mode is prefer because it remove any interference between the researcher and the respondents, it also remove any prejudice that may attached to a one on one interviews. The questionnaires were sent through emails to all the respondents who reside in different parts of the country. Completed questionnaires were received after three weeks through the same electronic means. This deadline for submission is important due to the busy itineraries of the researcher, this gives ample time for the researcher to collate and analyze.

3.5 Data analysis

As defined by Yin, (2009), data analysis is the process by which data collected during a research is process, edited and transformed with the aim of picking useful information with respect to the research objectives of the research. The questionnaires were collected via email. They were well-checked to ascertain consistency in responses before inputting them into the system. They were grouped into columns and rows, and similarities and differences in response were compared. The data was analyzed through Microsoft Excel and the results were interpreted and displayed in percentages through a table.

3.6 Ethical considerations

Different types of research aims and objectives has made it very imperative to adhere to ethical rules. These rules always uphold the research objectives, sampling, and specificity of data, analysis and avoidance of errors. In the same vein, prohibition of false research data or formulations will always help to authenticate the truth and prevent errors. In most cases, research requires the view and support of different types of people in different fields and sectors, ethical consideration upholds beliefs to share mind, fairness, openness and accountability. For example, laws such as copyrights, patents, trademarks and licenses are put in place to guard intellectual properties (Ali, 2009).

David and Resnik, (2015), in their publication titled "What is Ethics in Research and why is it important" clearly stated that Honesty, Objectivity, Integrity, Carefulness, Respect for intellectual property, and confidentiality are principal terms in considering research ethics.

This research is not an exemption, it is in line with the above-raised points. I sorted for approvals from all the respondents and I assured them of the confidentiality of their responses. I also got approvals from the Human resources departments of all the companies I used as samples. All data used are well-referenced to avoid plagiarism, and the methods, findings and reporting can be verified and relied on. None of the data used was fabricated or falsified.

4 Results and analysis

4.1 Overview of the manufacturing sector in Nigeria

The manufacturing sector in Nigeria has evolved over the years. Despite numerous challenges it has encountered such as poor power supply, poor infrastructures, and instability in government policies, the strengths are obvious ranging from the availability of locally sourced raw materials to high demand for locally made products. This, therefore, gives a large room for future expansion in the sector.

According to the National Bureau of Statistics in Nigeria (2013), the contribution of the manufacturing sector to the economic output of Nigeria's GDP prior to the oil boom in the 1970s was estimated to be 10%. However, with the fall in oil prices in the international market in the 1980s opened up more attention to the sector. In addition, the recent recession experienced by the country because of low oil prices in 2015 shifted attention to the manufacturing sector especially the fast-moving consuming goods (FCMG). All through the 1990's to 2000's, Nigeria's economy largely depended on oil and gas thereby leading to the abysmal decline in the returns from the manufacturing sectors. As a result of this, majority of the big companies left the country leaving some few that are not performing to their full capacity. The graph below show the trend of contribution by the manufacturing sectors to the Nigeria GDP from 1980 to 2000. (NBS, 2001)

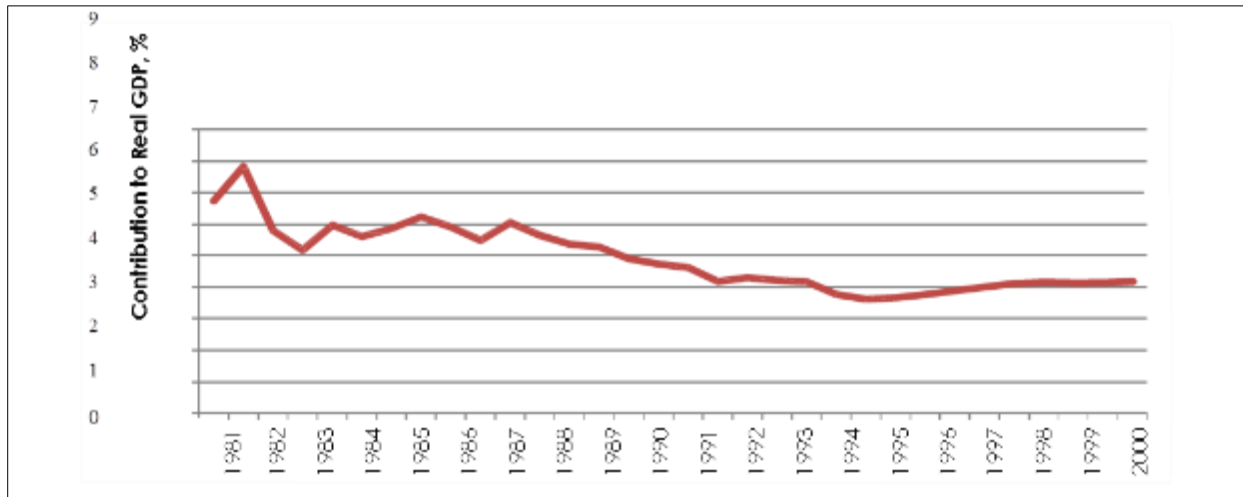


Figure Manufacturing sector contribution to the National GDP (source: NBS, 2001)

4.2 Composition of Nigeria's manufacturing sector

According to the National Bureau of Statistics reports (2013), the contribution of the manufacturing sectors to the national GDP has been as follows; in 2010, (6%), 2011 (28%), 2012 (29%) and 7% in 2013. For this study, the focus will be on five sectors, which include Oil and Gas, Food, Beverage and Tobacco, Pharmaceuticals, Textile, Wood and wood products. These five sectors of focus mentioned above were critically reviewed in this study. In 2017, according to some statistics generated by the National Bureau of Statistics, contributions to the national GDP per quarter were analyzed and displayed in the table below.

Table 1 Contribution of Manufacturing Sectors to GDP (source: NBS, 2018)

	Units	Scale	2017 Q1	2017 Q2	2017 Q3	2017 Q4
Total	₦' Million	units	26028356	26986005	29451304	31209138
Food, Beverage And Tobacco	₦' Million	units	1100504.5	1124771.9	1135903.6	1207663.9
Textile, Apparel And Footwear	₦' Million	units	565538.33	545746.65	590960.29	642554.37
Oil and Gas	₦' Million	units	38598.236	67406.557	63142.016	42693.411
Wood And Wood Products	₦' Million	units	78831.873	71976.151	75465.899	78851.905
Pharmaceutical Products	₦' Million	units	51561.696	57459.038	57193.089	58911.99

4.3 Response rate

Table 2 Sample size

Subsector	Number of Questionnaire
Oil and Gas	5
Pharmaceutical	5
Textiles, Apparel and Foot wares	5
Food, Beverage and Tobacco	5
Furniture	5
Total	25

The manufacturing sector in Nigeria is very large, comprising different subsectors. Due to the broadness of this sector and for this study, a stratified method of sampling has been used to group the manufacturing sector into five (5)

subsectors, while random sampling was used to select five (5) different companies from each subsector selected earlier. This is shown in the table below.

In all, the study targeted 25 companies. The response rate is displayed in the table below

Table 3 Response rate

Targeted Population	Response	Percentage
25	24	96%

From the table above it shows that out of the 25 questionnaires that were distributed to 25 companies, only 24 responded which makes it a 96% response rate. According to Zsidisin and Hendrick (1998), it was concluded that in any survey, 50% response rate is adequate, 60% is good while 70% and above response rate is rated very well response. All the collected questionnaires were duly scrutinized and thus fit for analysis.

4.4 Analysis of data

After collating all data, the findings were analyzed, and presented in percentages. Responses gathered through the questionnaires were related to the different research questions raised in the study.

4.4.1 Research question 1

How can the three pillars of sustainability (environment, economy and social) impact supply chain performance?

To provide the answer to research question 1, responses from questionnaires 1,2,3,4 and 5 were reviewed.

- A careful evaluation of the general awareness and impact of sustainability on supply chain performance among the manufacturing companies in Nigeria was done, and it was revealed that a little bit above the average manufacturing companies are well aware of sustainability and its impact on supply chain performance. A larger number seem to consider profit at the expense of environmental impact when planning for purchasing of their raw materials. Most of their sustainability policies were just limited to theory.
- Outlined below are the responses gotten from each of the questionnaires. (1= Totally Agree, 2= Agree, 3= Disagree, 4 = Totally Disagree)

Table 4 Research Question 1 analysis

S/No		1	2	3	4
1	We are well aware of sustainable supply chain management	12%	56%	12%	20%
2	We practice Sustainability in our supply chain processes	8%	42%	33%	17%
3	We consider environmental issues when making purchasing decisions	0%	26%	52%	22%
4	We partner with suppliers who are committed to sustainability	0%	29%	46%	25%
5	Consumers are carried along in making some decisions	38%	54%	4%	4%

A careful look at the above table shows that the concept of sustainability in supply chain management is not a very new concept among some manufacturing companies in Nigeria. Most of the subsector seems to be well aware of it (about 56%); however, implementation is very important.

Findings also show that just a few manufacturing companies consider environmental issues when making decisions on purchasing. Greater numbers of the suppliers too are not very committed to sustainability. It will be difficult for any organization to claim practicing sustainability when the suppliers and all other stakeholders are not.

4.4.2 Research question 2

Sustainable supply chain management practices: To what extent are they adopted by manufacturing companies in Nigeria?

In order to provide an answer to research question 2, responses from questionnaires items 1 to 9 were reviewed.

- A closer review of the responses from the respondents revealed that there is a vast difference between the general awareness of sustainability and the adoption of sustainable supply chain management practices. Adoption of these practices are not well spread among manufacturing companies in Nigeria, while some companies are very strong in one practice, some are very weak in another. To increase market competitiveness and profitability, the adoption of sustainable supply chain management practices must be holistic.
- Section B of the questionnaire addresses the second research question and the responses were reviewed and outlined below. (1= Totally Agree, 2= Agree, 3= Disagree, 4 = Totally Disagree)

Table 5 Research Question 2 analysis

S/No		1	2	3	4
1	We have adopted Sustainable supply chain management practices	8%	29%	42%	21%
2	We practice Reverse logistics	4%	12%	40%	44%
3	We practice Sustainable warehousing	33%	42%	17%	8%
4	We practice Environmental Purchasing	0%	26%	52%	22%
5	We practice Sustainable Transportation	0%	4%	42%	54%
6	There is a shorter Lead time for our product delivery	12%	42%	25%	21%
7	Our Packaging materials are recyclable	8%	25%	29%	38%
8	Our Packaging materials are bio-degradable	8%	21%	33%	38%
9	Our Packaging materials are reusable	4%	17%	37%	42%

From the responses of the respondents above, it shows that the adoption of sustainable supply chain management practices is very low among manufacturing companies in Nigeria. From the above table, it can be observed that the level of adoption of these sustainable supply chain management practices is very low across all the subsectors.

Obviously, from the findings above only sustainable warehousing (75%) has been practiced well among all the sustainable supply chain management practices. Adoption of others are still very low, reverse logistics (16%), environmental purchasing (26%), and sustainable transportation (4%). The summary of these findings shows that so much is still needed to be done in terms of adoption of sustainable practices by manufacturing companies in Nigeria.

4.4.3 Research question 3

How can practicing sustainable supply chain management translate to doing business right generally?

To provide an answer to research question 3, responses from questionnaires items 1 to 6 were reviewed.

- Judicious adoption and implementation of sustainable supply chain management practices and their translation to increase market competitiveness cannot be over-emphasized. This has been reported and published by different authors and researchers. A review of different literature has shown that manufacturing companies in Nigeria are not performing optimally because just a few of them practice the concept of sustainability. (1= Totally Agree, 2= Agree, 3= Disagree, 4 = Totally Disagree)

Table 6 Research Question 3 analysis

Sr no.		1	2	3	4
1	Practices of sustainability have greatly reduced costs in our supply chain section	8%	17%	42%	33%
2	All our suppliers have totally adhered to sustainability policies	4%	13%	50%	33%

3	All our staff members are consciously aware of sustainability	8%	17%	42%	33%
4	We are seen as a model in practicing sustainable supply chains by other organizations in the same sector	4%	8%	50%	38%
5	There is a shorter lead time for our deliveries	12%	42%	25%	21%
6	Increased market competitiveness	13%	33%	50%	4%

Responses from respondents as shown in the table above revealed that due to the low implementation of sustainability practices among manufacturing companies in Nigeria, the outcomes are very low. Only 46% of the sample companies agreed that the adoption of these practices has increased their market competitiveness, this is below the average. More worrisome from the finding is that just about 12% of sample companies can confidently boast that they are role model of sustainability among other manufacturing companies in Nigeria.

There is a general misconception that adopting sustainable supply chain management practices is very expensive, little wonder the percentage of companies that have experienced reduction in cost while adopting the practices is 25% as seen from the table above. On the contrary, several literature reviews has established that adoption of these practices has shown to reduce cost and increase profitability in the developed countries.

According to Salah and Faisal (2015), the effect of sustainable supply chain management practices has both academic and managerial implications. In their publication, they further submitted that there were three significant impacts supply chain management practices have over business: (1) financial performance, which includes a reduction in the cost of materials for purchasing, waste management, and energy consumption. (2) Environmental performance, these include reduction in environmental accidents, reduction of air and water pollution. (3) Operational performance, includes improvement in lead time for delivery, increase in product quality, and inventory reduction.

4.4.4 Research question 4

What are the issues/factors if any, that is making sustainable supply chain management difficult to implement among manufacturing companies in Nigeria?

A review of several findings shows that there are many reasons why the adoption of sustainable supply chain management practices is very poor among manufacturing companies in Nigeria. This ranges from the individual objectives of each subsector to the enforcement of governmental laws.

Section D of the questionnaire of the study highlighted some identified factors and the responses of the sample population were displayed in the table below.(1= Totally Agree, 2= Agree, 3= Disagree, 4 = Totally Disagree)

Table 7 Research Question 4 analysis

		1	2	3	4
1	Lack of Free flow of information among all stakeholders	17%	62%	13%	8%
2	Poor Top management support	9%	74%	13%	4%
3	Political will and Government support	8%	34%	54%	4%
4	Weak enforcement of legislation/laws	50%	34%	8%	8%
5	Poor Public awareness	42%	42%	8%	8%

These highlighted factors affect the adoption at different degrees, poor public awareness (84%), weak enforcement of legislation (84%), political and government will (12%), poor top management support (83%) and lack of free flow of information among stakeholders (79%).

5 Discussion

Findings from this study revealed the general perception or awareness of manufacturing companies in Nigeria about sustainable supply chain management practices, the level of its adoption, and some challenges faced in its

implementation towards increasing market competitiveness. General awareness about the impact of sustainability on supply chain management is seen to be a bit above average from the findings. However, according to Chung (2005), translating the awareness of the impact of the triple bottom line into increased business profitability is very important. This is in line with Zhu and Sarkis (2004), that a deliberate focus on environmental, economic, and social impacts will improve the total outcomes of sustainable supply chain management.

Results from this study has also showed that the level of adoption of some sustainable supply chain management practices among manufacturing companies in Nigeria is poor. For instance, only about 26% agreed to be practicing environmental purchasing, this contradicts the submissions of Min and Galle (1997) that there will be a drastic reduction in the impact of the natural environment when there is an improvement in environmental purchasing. One of the possible reason for this low level of environmental purchasing among manufacturing companies in Nigeria could be attributed to the different ideology of these firms as majority of them are profit driven and they can do anything to increase their profit share at the expense of negative environmental impact. Carter et al. (2002) has proven in their publications that environmental purchase has a positive effect on company's net income.

The findings show that the number of firms that practice reverse logistics is just 16%. One of the reasons for this low participation may not be too far from the submission of Drumwright (1994), that intra-organization factor is the main reason why companies do not practice reverse logistics. This includes lack of sincere commitment from the management of most firms to adhere to the implementation of environmental policies. However, according to Craig and Dale (2008), the total cost of production or manufacturing is been reduced when you have reduced resources and materials which is the hallmark of practicing reverse logistics. As stated in the literature review previously, a study by Lambert, (2006), has shown that the Network System division of AT &T has saved close to \$100 million within 19 months since they started to practice reverse logistics in their establishment.

Results from the study also showed that of all the sustainable supply chain management practices, sustainable transportation is the least adopted. Only about 4% of the manufacturing firms practice it in Nigeria. Little wonder why most of the well-populated cities in the country are characterized with high air pollution. This is in line with the publication by Michael (2011), that various kind of transportation contribute between 20% to 25% of energy which invariably increases the greenhouse effect that is release to the atmosphere. For any organization to practice sustainable transportation, these three goals must be met; (1) the system must be able to provide accessibility for products and individuals without hampering the ecosystem. (2) it must be efficient and affordable following sustainability guidelines and (3) it must reduce emissions in its operations thereby protecting the ecosystem (Council of Transport Ministers of the European Union, 2001).

Of all the sustainable supply chain practices, sustainable warehousing is the most adopted among the manufacturing firms in Nigeria. About 75% of firms are currently practicing this in the country as revealed by this study. As stated in the literature review, according to Hesse (2004), developing sustainable warehousing should be the type that has an inter-relational link with the organization's economic objective, staff's welfare, and minimization of environmental impact. This is seen to be well practiced among manufacturing companies in Nigeria.

Finally, from the findings, some obstacles were also identified as the factors that are hindering the implementation or adoption of sustainable supply chain management practices among manufacturing companies in Nigeria. These factors were seen to affect the adoption of sustainable practices in varying degrees (lack of free flow of information among stakeholders 79%, poor top management support 83%, political and government will 12%, weak enforcement of legislation/laws 84% and poor public awareness 84%) these factors are similar to those published by Al et al (2013). This is also consistent with the findings of Faruk et al (2001) as stated in the literature review.

6 Conclusions

Globally, there is an increasing customer awareness of environmental and social sustainability issues. This increased awareness tend to put pressure on supply chain to develop and engage in products and distribution systems that are sustainable. It is clear from this study that supply chains should take advantage inherent in the triple bottom line to foster sustainability and increase business competitiveness. The purpose of this study is to uncover the advantages inherent in adopting sustainable practices of supply chain in increasing business profitability among manufacturing companies in Nigeria. Three objectives were set to achieve this purpose.

First, manufacturing sector in Nigeria play an important role in contributing to the GDP of the country. For this study, this sector was further divided into five subsectors (oil and gas, pharmaceuticals, Textiles, Furniture and Food, Beverages, and tobacco). From the study, we found out that the level of adoption of sustainable supply chain

management practices is very poor. General awareness is seen to be a little above average, but to what advantage is knowledge when it cannot be translated into action?

Second, this study identified some key practices that must be adopted by manufacturing companies to achieve sustainability in their supply chain. These are but not limited to; Environmental Purchasing, Reverse Logistics, Sustainable Warehousing, and Sustainable Transportation. According to Gupta (1995), these practices are the collective responsibility of all the stakeholders for effective sustainable supply chain management. In line with this, manufacturing companies in Nigeria seem to have adopted some of these practices even though at varying degrees. Of all the four sustainable practices that were focused on in this study, only sustainable warehousing has been well adopted in the sector. There are more work to be done towards the adoption of others; this will require a strong commitment from all the stakeholders by aligning their priorities towards protecting the ecosystem.

Lastly, this study also explored the relationship between the outcomes of sustainable supply chain management practices and business profitability among the manufacturing companies in Nigeria. According to Catherine and George (2016), adoption of sustainable supply chain management practices has been found to increase market competitiveness especially in an environment with stiff competition and enlightened consumers. This submission is in line with the results of findings from this study as shown by the responses of the respondents. With this study, it has been shown that there is a direct relationship between outcomes of sustainable practices and business profitability. Some of these are; increased competitiveness, reduction of resources in manufacturing, and increased customer loyalty to companies which will ultimately translate to increased market share and profitability. Furthermore, it was found that adoption of sustainable practices will increase sales, improve corporate image of the firm and improve sharing of information among all the stakeholders. None of the outcomes identified by this study were different from the submissions of Catherine and George (2016).

6.1 Suggestions for further research

There are enormous opportunities for further research as a result of this work. The concept of sustainability is an evolving topic, especially in a country like Nigeria. Consequently, this concept can be spread into other sectors in the country. This study has only focused on the manufacturing sector out of many other sectors that contribute to the national economic growth, other sectors such as transportation, agriculture, mining, etc can be looked into.

In addition, business profitability is very important, the aspect of deducing to what extent an organization has increased its profitability should be looked into, perhaps another research method such as the qualitative method can be used for that since the method used in this study was quantitative research method.

Lastly, one of the limitations of this study was that the suppliers were not directly engaged rather; the focus was on the organization in line with the objectives of the study. Further study can focus mainly on the supplier's activities in the supply chain process alone, that is, a thorough investigation can be done to look into how these suppliers usually source their raw materials.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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Appendix I

Survey Questionnaire

- Sustainable supply chain management: the right way of doing business in NIGERIA

Dear Sir/Ma,

This questionnaire aims to examine the engagement of organizations in supply chain management practices. Your response is very important to this survey. Kindly note that all responses will be kept confidential and not traced to any respondent. Though there are no right or wrong answers, however, we would appreciate an honest assessment of the organization's activities in line with sustainable supply chain management.

Questions related to supply chain management will be asked, in case you are too busy to respond you can delegate another staff who is also vast in supply chain management to do so. Answering the questionnaire should not take more

than 5 minutes to do. Kindly spare a few minutes from your busy schedules to attend to this survey as your response is very important to the success of this study.

Once done with the questionnaire, kindly email me back through the email address below. Thank you in advance for your cooperation.

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- Section A: Impacts of the three pillars of sustainability on supply chain management performance

Kindly indicate by ticking the level of your organization’s agreement with the following statements (1= Totally Agree, 2= Agree, 3= Disagree, 4 = Totally Disagree)

S/No		1	2	3	4
1	We are well aware of sustainable supply chain management				
2	We practice Sustainability in our supply chain processes				
3	We consider environmental issues when making purchasing decisions				
4	We partner with suppliers who are committed to sustainability				
5	Consumers are carried along in making some decisions				

- Section B: adoption of sustainable supply chain management practices

Kindly indicate by ticking the level of your organization’s agreement with the following statements (1= Totally Agree, 2= Agree, 3= Disagree, 4 = Totally Disagree)

S/No		1	2	3	4
1	We have adopted Sustainable supply chain management practices				
2	We practice Reverse logistics				
3	We practice Sustainable warehousing				
4	We practice Environmental Purchasing				
5	We practice Sustainable Transportation				
6	There is shorter Lead time of our product delivery				
7	Our Packaging materials are recyclable				
8	Our Packaging materials are bio-degradable				
9	Our Packaging materials are reusable				

- Section C: Outcomes of Sustainability on Business profitability

Kindly indicate by ticking the level of your organization’s agreement with the following statements (1= Totally Agree, 2= Agree, 3= Disagree, 4 = Totally Disagree)

		1	2	3	4
1	Practices of sustainability has greatly reduce cost in our supply chain section				
2	All our suppliers have totally adhere to sustainability policies				
3	All our staff members are consciously aware of sustainability				
4	We are seen as a model in practicing sustainable supply chain by other organization in the same sector				
5	There is shorter lead time in our deliveries				
6	Increased market competitiveness				

- Section D: Challenges affecting the implementation of Sustainable supply chain management practices

Kindly indicate by ticking the level of your organization’s agreement with the following statements (1= Totally Agree, 2= Agree, 3= Disagree, 4 = Totally Disagree)

		1	2	3	4
1	Lack of Free flow of information among all stakeholders				
2	Poor Top management support				
3	Political will and Government support				
4	Weak enforcement of legislation/laws				
5	Poor Public awareness				

Appendix II

List of manufacturing companies

- PHARMACEUTICAL SECTOR
 - FIDSON HEALTHCARE PLC
 - MAY & BAKER PLC
 - ELBE PHARMA LTD
 - SWIPHA PHARM NIG LTD
 - DANA DRUGS LTD
- OIL AND GAS SECTOR
 - NIGERIA AGIP OIL COMPANY LIMITED
 - CHROME GROUP LTD
 - OSEBERG OIL & GAS NIG LTD
 - MASFERS ENERGY OIL & GAS LTD
 - OILWORLD LTD
- WOOD AND WOOD PRODUCTS SECTOR
 - ALIBERT FURNITURE NIG LTD
 - VINA INTERNATIONAL LTD
 - WOOD-ET AL LTD
 - BEDMATE FURNITURE
 - LIFEMATE FURNITURE
- TEXTILES AND FOOTWARES SECTOR

- AFRICAN TEXTILE MANUFACTURERS LTD
 - DA VIVA TEXTILE
 - FEMRO 3 NIG LTD
 - HAFFAR INDUSTRIAL COMPANY LTD
 - QUALITEX TEXTILES LTD
-
- FOOD, BEVERAGE AND TOBACCO SECTOR
 - FRIESLAND CAMPANIA
 - SUMAL FOODS LTD
 - NESTLE NIG PLC
 - MOJO NIG LTD
 - CADBURY NIG PLC