

## Environmental Management System and Green Supply Chain Management: A Study of National Disaster Management Organization, Nadmo

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### Abstract

The purpose of this research is to identify the impact of environmental management system and green supply chain management (a case study of national disaster management organization NADMO), with some problem statement which include, Lack of coordination in the activities of various governmental and non-governmental agencies in the management of disasters. The research method used for this study include experimental research, questionnaires, etc. the researcher administered twenty (20) questionnaires to specific departments within the organization where information where gathered for a successful completion of these project. This research illuminates the debate by empirically evaluating the relationship between environmental management system (EMS) and green supply chain management (GSCM) practices. In sum, this research reveals that organizations that adopt environmental management systems EMSs more frequently implement green supply chain management (GSCM) practices, regardless of how long the EMS has been in place. These results suggest that EMSs and green supply chain management (GSCM) may complement each other, and that EMS adopters have a stronger probability of improving the environment not just within their organizational boundaries, but throughout their network of buyers and suppliers. Amidst several recommendations, the researcher finally recommended that, the green supply chain management and environmental management efforts in national disaster management organization (NADMO) should be appreciated and there should be systems for recognition and appreciation of implementation of these systems in order to motivate the staff to work effectively.

**Problem Statement:** Environmental management systems (EMS) become a significant issue among organizations. Experiences from organizations indicates that background of great part of problems related to their implementation are of human origin misunderstanding, resistance to change, attitudes and inability of long-term planning. Lack of coordination in the activities of various governmental and non-governmental agencies in the management of disasters.

**Keywords:** Environmental Management System, Green Supply Chain Management, Disaster Management

### 1.0 INTRODUCTION

Researchers question the legitimacy of environmental management system (EMS) since organizations claim to have one when in fact they make no attempt to reduce their environmental harm. Environmental Management System (EMS) are strategic management approaches that define how an organization will address its impacts on the natural environment (Handfield et al., 2004). In instances where Environmental Management Systems (EMS) enhance an organization's environmental performance, critics argue that improvements are likely to occur within the organization's operational boundaries rather than being extended throughout the supply chain. However, previous research suggests that the organizational capabilities required to adopt an environmental management system (EMS), may facilitate green supply chain management (GSCM) implementation and the institutional pressures to adopt both management practices. Consequently, environmental management system adopters may have a greater propensity to expand their focus beyond their organizational boundaries and utilize green supply chain management (GSCM) practices to minimize system-wide environmental impacts. This research illuminates the debate by empirically evaluating the relationship between environmental management system and green supply chain management practices (Coglianese and Nash, 2001). An environmental management system is used to address an organizations impact on the environment. Organizations implement such systems to maintain compliance with environmental regulations, lower environmental costs, reduce risks, train, train employees, develop indicators of impact, and improve environmental performance. An environmental management system typically consists policies, goals, information systems, task lists data collection and organization, emergency plans, audits, regulatory requirements and annual reports (Initch et al. 1998; Stapleton et al. 2001)

The International Organization for Standardization (ISO) defines an environmental management system as the part of the overall management that includes organizational structure, planning activities, responsibilities, practices, procedures, processes and resources for developing, implementing, achieving, reviewing and maintaining policy (ISO, 1996).

In 1996, the Federal Facilities Council which operates under the aegis of the National Research Council, established a standing committee on environmental Engineering with the express purpose of providing a forum where federal environmental engineers and program managers could meet on a regular basis to exchange information about facilities related environmental programs, policies, issues. The committee members like environmental program managers in other types of organization, are increasingly concerned about achieving and demonstrating sound environmental performance by meeting the requirements of environmental regulations and limiting the impacts of their products or services on the environment. Traditionally, environmental protection staff within an organization have focused primarily on complying with environmental regulations, a set of standards that are point-in-time concepts relating to environmental performance and protection (Shireman, 2003). Some organizations discovered that when it comes to environmental protection compliance is not enough; an organization can be in full compliance with the law and still produce products and services that have negative impacts on the environment.

## 2. LITERATURE REVIEW

Research has evaluated the reasons why organizations adopt an environmental management system EMS and the potential these environmental strategies have for improving the environment. (Bansal and Hunter, 2003; Darnall, 2006), questions remain about whether organizations are using their environmental management systems to challenge their supplier networks to become more environmentally sustainable. At issue is that environmental management systems do not require organizations to improve their environmental performance, but instead focus on creating and documenting environmental policies and procedures (Krut and Gleckman, 1998). Additionally, there is no way of externally verifying that an organization's environmental performance improvements actually occur (Rondinelli and Vastag, 2000). Environmental management systems therefore may represent only symbolic efforts to improve an organization's image (Bansal and Clelland, 2004). In instances where environmental management systems enhance an organization's environmental performance (Potoski and Prakash, 2005; Khanna and Anton, 2002; King et al., 2005), some scholars suggest that improvements are likely to occur within the organization's operational boundaries rather than being extended throughout the supply chain (Handfield et al., 2004).

Moreover, environmental management system adopters may have little reason to 'green' their supply chains, since they can market themselves as being environmentally proactive (by virtue of having an EMS) without undertaking these additional efforts. Despite these concerns, the operational capabilities necessary to adopt an environmental management system may also assist an organization's efforts to reduce its environmental impacts throughout its supply chain (Sarkis, 2001). EMS adopters therefore may be more likely to rely on their complementary knowledge-based capabilities towards working with their networks of suppliers and customers to minimize system-wide environmental impacts. In other instances, organizations that chose to adopt an environmental management system may endure the same institutional pressures as organizations that adopt green supply chain management practices, which is why they utilize both environmental management practices simultaneously. Regardless of the nature of their potential complementarity, organizations that adopt environmental management systems may have a greater probability of implementing environmentally sustainable management practices by considering their environmental impacts beyond their organizational boundaries. This research examines the potential environmental management systems have for promoting environmental sustainability through their networks of suppliers and customers. It characterizes the relationship between environment management systems and green supply chain management practices and offers empirical evidence indicating whether environmental management systems complement global supply chain management strategies.

### 2.1 ENVIRONMENTAL MANAGEMENT SYSTEMS

An environmental management system consists of a collection of internal policies, assessments, plans and implementation actions (Coglianese and Nash, 2001) affecting the entire organization and its relationships with the natural environment. Although the specific institutional features of environmental management systems vary across organizations, all environmental management systems involve establishing an environmental policy or plan; undergoing internal assessments of the organization's environmental impacts (including quantification of those impacts and how they have changed over time); creating quantifiable goals to reduce environmental impacts, providing resources and training workers; checking implementation progress through systematic auditing to ensure that goals are being reached; correcting deviations from goal attainment and undergoing management review (Coglianese and Nash, 2001). Based on Deming's (1986) continuous improvement model, environmental management systems are intended to help organizations embed environmental practices deep within their operational frameworks so that protecting the natural environment becomes an integral element of their overall business strategy (Shireman, 2003). For these reasons, environmental management systems increasingly are being recognized as systematic and comprehensive mechanisms for improving environmental and business performance (Curcovic et al., 2000). Once an

organization implements an environmental management system, it may elect to have it certified to the ISO 14001 standard.

Developed by the International Organization for Standardization (ISO) in 1996, ISO 14001 adoption requires certification by an independent third party auditor, who helps to ensure that the environmental management system conforms to the ISO 14001 standard. In preparation for certification, an organization must characterize the procedures and plans that form its environmental management system. Once certified, the ISO 14001 label indicates that the organization has implemented a management system that documents the organization's pollution aspects and impacts, and identifies a pollution prevention process that is continually improved over time (Bansal and Hunter, 2003; Darnall, 2006). Organizations that adopt environmental management systems, regardless of their form, can benefit from improving their regulatory compliance, which in turn can enhance their corporate image and increase profits (Stapleton et al., 2001). For example, Federal Foam Technologies, Inc., a Minnesota-based company, adopted an environmental management system and certified it to ISO 14001. By relying on its environmental management system structure, the firm reduced its annual landfill use by 40 percent, and decreased its associated disposal costs and liability risks (MPCA, 2001). Environmental management systems also have been associated with improved manufacturing efficiency, customer satisfaction, and new access to markets (Darnall et al., 2001). To the extent that environmental management systems improve an organization's environmental performance (Potoski and Prakash, 2005; Khanna and Anton, 2002; King et al., 2005), they also may increase its economic gains through enhanced operational efficiencies (Russo and Fouts, 1997; Porter and van der Linde, 1995).

Interest in environmental management systems extends beyond the organizations that adopt them. Regulators are especially interested in their potential to achieve greater environmental protection. For example, within the US, the Environmental Protection Agency (EPA) is providing leadership in the development of environmental management systems and promoting wider adoption of environmental management systems across a range of organizations and settings (USEPA, 2001). Regulator interest in environmental management system is based on the notion that the benefits associated with reducing pollution can be enjoyed by society at large (Coglianese and Nash, 2001; Ortiz, 1995; Fiorino, 1999; Curcovic et al., 2000). However, in spite of the burgeoning interest in environmental management systems and the benefits they offer, we know very little about the relationship these systems have with an organization's supply chain and whether environmental management system adopters promote green supply chain management practices. Questions arise since environmental management systems do not require organizations to evaluate the environmental impacts of their supply chains. Rather the environmental management system focus generally extends to the organization's boundaries (Handfield et al., 2004). While environmental management systems have been linked to stronger environmental performance than other voluntary environmental techniques – such as corporate environmental reporting (Annandale et al., 2004), this improved performance may occur only within the organization's internal operations. In other instances, improved performance may not occur at all (Krut and Gleckman, 1998), because some organizations may be adopting environmental management systems symbolically in an effort to enhance their reputation without reducing their environmental impact (Bansal and Hunter, 2003), since there is no way for external stakeholders to verify whether environmental performance improvements actually occur (Rondinelli and Vastag, 2000).

Related to green supply chain management practices environmental management system adopters may be less likely to utilize since their environmental management system allows them to market their environmental proactiveness without burdening their supply chain (Krut and Gleckman, 1998). This issue may be of particular relevance since some scholars argue that global supply chain management practices have relatively little reputational consequences that affect the end customers' purchasing decisions (Preuss, 2005). Even for the most widely recognized environmental management systems, which undergo external certification (such as ISO 14001), organizations are not required to engage their suppliers (Krut and Gleckman, 1998). For these reasons, questions remain about whether or not environmental management systems lead to meaningful environmental improvements (Krut and Gleckman, 1998; Honey and Stewart, 2002) outside their organizational boundaries. However, in practice environmental management systems may encourage some organizations to expand their environmental considerations beyond their internal operations to their suppliers and customers. If so, environmental management system adopters may create additional opportunities to enhance environmental sustainability by reducing pollution throughout their supply chain.

## 2.2 Green Supply Chain Management

The supply chain consist of all parties who are involved in fulfilling a customer request, including the suppliers, transporters, warehouses, retailers and customers themselves (Cox, 1999). The most common green supply chain management practices involve organizations assessing the environmental performance of their suppliers, requiring suppliers to undertake measures that ensure environmental quality of their products, and evaluating the cost of waste in their operating systems (Handfield et al., 2002). However, green supply chain management practices also

extend to the entire value chain (from supplier to consumer) when organizations inform buyers of ways to reduce their impacts to the natural environment (Handfield et al., 2004). Each of these actions has the potential to reduce the direct and indirect environmental impacts of an organization's final product. An organization's direct environmental impacts stem from inputs that increase waste during product storage, transportation, processing, use or disposal. These impacts originate from an organization's first tier suppliers. Indirect environmental impacts relate to an organization's second tier suppliers' products (or suppliers further upstream), which produce inputs used in the first tier supplier's production process. These inputs have an indirect impact on the final producer's products, production waste and disposal (Handfield et al., 2004).

As such, organizations that purchase inputs from a specific supplier also acquire waste from each supplier up the supply chain. These distinctions are important because organizations that adopt green supply chain management practices generally evaluate the environmental impacts of their first tier suppliers (Handfield et al., 2002), but often do not control for the impact of waste streams beyond first tier since they lack the internal process to do so. While this narrow focus is a shortcoming in some applications of green supply chain management, historically most organizations rarely restrict their purchasing decisions to suppliers (at any level) with certain environmental criteria (Preuss, 2005). In recent years, some organizations have begun relying on their supply chains to improve their business performance and create value for their end customers (Handfield and Nichols, 2002). Manufacturers also are calling on their suppliers more frequently to create innovative ideas that exploit new emerging technologies, and reduce costs during the design and development of their products (Handfield et al., 1999).

In some instances, organizations are even relying on their suppliers to deliver state-of-the-art process technology that they cannot develop internally. Consequently, enterprises wishing to minimize their environmental impacts during product design are learning that their ability to do so often is dependent on their ability to manage their increasingly complex supplier relationships. For instance, to avoid environmental risks from its suppliers, Dow Chemical, one of the largest green producers of chlorine, partnered with its transportation supplier to design rail cars that were two times thicker than was required by US regulations and by the chemical industry association. The company's decision was based on a discovery that, in the event of a derailment, the rail car had a significant probability of puncturing upon impact and placing neighboring communities and ecological systems at risk. However, Dow lacked the internal expertise to address the problem on its own. By collaborating with its transportation supplier to design an innovative car that would not rupture, the new rail car soon became the industry standard. Consequently, Dow Chemical established a leadership position and increased its credibility with regulators and industry peers. Similarly, in the automotive industry, some manufacturers have formed partnerships with their paint and related chemical suppliers in an effort to develop innovative environmentally benign inputs that car makers could not develop on their own (Geffen, 1997; Geffen and Rothenberg, 2000).

In other instances, organizations are focusing more tightly on their core competencies and relying on their suppliers to a greater degree for non-core activities such as new product development through early design and concurrent engineering (Pralhad and Hamel, 1990; Ragatz et al., 2002). These organizations are choosing to green their supply chain to avoid inheriting environmental risks from less environmentally conscious suppliers (Klassen and Whybark, 1999). The global automotive industry is an example of one sector that collectively is considering the environmental attributes of its suppliers to avoid environmental risks. For instance, by evaluating the plastic and steel components in its product design cycle, the automotive industry has reduced its risk of inheriting environmental problems from its suppliers and minimized its long-term environmental liabilities (Gupta and Piero, 2003). Similarly, in 2002, Hewlett-Packard established its Supply Chain Social and Environmental Responsibility Policy. The company also instituted a supplier code of conduct. Combined, these efforts have extended Hewlett-Packard's corporate social responsibility commitment by incorporating its global supply base and reducing its supply chain risks. Like environmental management systems, regulators also have expressed interest in green supply chain management practices by encouraging their more widespread use. For example, in 2000, the US EPA's Design for the Environment (DfE) program funded a partnership between EPA, the University of Tennessee and Saturn Corporation to explore different methods of promoting environmental improvement throughout Saturn's supply chain (Loveday, 2000). Building on this effort, in 2001, EPA established a pilot program with General Motors Corporation (GM) to develop a multimedia technical assistance program aimed at pollution prevention in GM's supply chain (USEPA, 2003). More comprehensive collaborations within the automobile industry include a partnership between EPA and automobile suppliers to create

The Suppliers Partnership for the Environment, a trade association comprised of automotive and vehicle suppliers seeking to create new and innovative business-centered approaches to environmental protection. The partnership provides a forum for automobile producers and suppliers to share environmental best management practices and to promote green supply chain management practices (Jusko, 2003). Like their interest in environmental management systems, regulators are encouraging organizations to adopt green supply chain management practices



because they believe that organizations that implement them will reduce their impact on the natural environment and therefore benefit society as a whole.

### **2.3 Characteristics of Environmental Management System**

An environmental management system is used to address an organizations impact on the environment. Organizations implement such system to maintain compliance with environmental regulations, lower environmental cost, reduce risk, train employees, develop indicators of impact and improve environmental performance. An environmental management system typically consists of policies, goals, information system, task list, data collection and organization, emergency plans, audits, regulatory requirements.

In general, an environmental management system should be based upon an organization`s documented environmental policy and contain the following characteristics;

- Goals, methods, and a timeline for meeting environmental requirement and voluntary undertakings
- Procedures for maintaining appropriate documentation relating to its goals
- A defined structure and the responsibilities for each task along with the availability of adequate resources

### **2.4 Relationship between Environmental Management System Adoption and Green Supply Chain Management Practices**

The relationship between environmental management systems and green supply chain management practices has potentially complementary and significant implications for an organization`s environmental sustainability, because together they offer a more comprehensive means of defining and establishing sustainability among networks of business organizations. However, when environmental management systems are adopted in the absence of green supply chain management, environmental benefits are likely to diminish. This is because the organization`s supply chain network does not share its environmental goals, and environmental sustainability of any organization is impossible without incorporating green supply chain management practices (Preuss, 2005). For instance, an organization may adopt an environmental management system and significantly enhance the environmental performance within its organizational boundaries, but its suppliers may not do the same. In other instances suppliers may increase their buyers` environmental harm. One example is seen in the US furniture manufacturers industry, where some furniture manufacturers have implemented green supply chain management practices to purchase wood from tier one suppliers that utilize sustainable forestry.

However, many of these furniture manufacturers have no systematic process to identify whether their tier one suppliers apply the same restrictions on tier two suppliers. As such, tier one suppliers may increase their environmental harm, despite the fact that they utilize sustainable forestry practices. The net effect may be an overall reduction in environmental sustainability, which is why companies implementing decisions across a network of organizations often see deteriorated system-wide performance (Nohria and Eccles, 1992), and why managing the entire supply chain is critical to achieving environmental sustainability goals. Some organizations have recognized these linkages and are responding by instituting coercive environmental mandates on their suppliers. As part of its environmental management system, for example, British Petroleum is requiring its suppliers to adhere to specific green supply chain management practices that are consistent with the organization`s environmental goals. These new supplier mandates are helping the company develop stronger delivery systems for its input stock of recycled materials throughout its supply chain. In so doing, BP hopes to increase environmental sustainability across its supplier network and improve environmental performance system-wide.

### **2.5 Capabilities for Adopting Environmental Management System and Green Supply Chain Management.**

There are numerous capabilities required to adopt an environmental management system that reduce the cost of adoption (Darnall and Edwards, 2006) and facilitate the implementation process. For instance, environmental management system adoption requires that an organization encourage its employees to work together, sharing their knowledge of the organization`s internal operations in order to minimize impact to the natural environment (Hart, 2005). It also requires an organization-wide commitment to continually improve the organization`s environmental impacts and extensive knowledge and monitoring of organizational resources, constraints, production capabilities and processes (ISO, 2001). Because their focus is on continual improvement, environmental management systems encourage enterprises to rely on lean production practices that promote reductions in input use, which are important for minimizing impacts to the natural environment (Darnall and Edwards, 2006). Similarly, organizations that have expertise with green supply chain management have developed their knowledge-based competencies by guaranteeing the environmental quality of incoming goods. Like environmental management systems, green supply chain management practices require organizations to have strong inventory control systems. These systems reduce redundant stock materials and unnecessary inputs in the production process (Rosenberg and Campbell, 1985). Organizations that

rely on these systems manage materials, productive capacity and other organizational information (Rosenberg and Campbell, 1985).

The skills required to adopt green supply chain management are therefore complementary to the capabilities required for the successful adoption of environmental management systems inasmuch as both systems encourage enterprises to reduce input use and decrease waste associated with input choices, which are important for minimizing impacts to the natural environment. At their core, both environmental management system and green supply chain management rely on what on Deming's (1986) continuous improvement model. Environmental management systems are systems of management processes that enable organizations to continually reduce their impact to the natural environment (Darnall and Edwards, 2006). Similarly, green supply chain management practices leverage continual improvement processes that reduce the impact of supplier inputs on the organization's final product (Preuss, 2005). The continual improvement capabilities necessary to maintain an environmental management system and implement green supply chain management practices can both be used to facilitate the introduction of pollution prevention programs and capabilities in cross-functional management that advance product stewardship goals. These capabilities also can be used to encourage environmental management system adopters to more readily determine the root cause of their environmental impacts, which may identify opportunities across their supply chain to improve environmental performance. Organizations that adopt environmental management systems must think holistically about their impacts on the natural environment (Coglianese and Nash, 2001).

In so doing, these organizations plan strategically for the long term and develop a capacity to assess their progress toward achieving desired outcomes (Kitazawa and Sarkis, 2000). Environmental management system adopters have also developed a culture that embraces internal evaluations that help push the organization towards achieving greater organizational efficiency (Lawrence and Morell, 1995; Welford, 1992) – both within and across operational units – which is critical for continuous environmental improvement (Netherwood, 1998). For these reasons, environmental management system adopters may have greater ease during green supply chain management implementation because they possess the internal tacit knowledge required to manage the environmental impacts of their supply chain, and are more likely to collaborate across the organization's internal departments to improve the environment. Collaboration across internal departments is essential to maintaining robust green supply chain management practices. For instance, in utilizing green supply chain management, an organization must coordinate its product design department with its marketing department and its suppliers in an effort to minimize waste and environmental impact at every node in the supply chain (Handfield et al., 2001).

However, traditional organizational structures generally are fragmented with purchasing departments operating separately from marketing and sales, and operations functioning independently from human resources, with each having their own goals (Trowbridge, 2001). One way that organizations are managing these relationships is to implement 'product design teams' that include representatives from numerous internal departments as well as suppliers who discuss environmental issues throughout product design. These teams often rely on lifecycle analysis to ensure minimal impact from raw material extraction to final disposal (i.e. cradle to grave) (Heiskanen, 2000). Similar to environmental management systems, which encourage cross-departmental coordination, implementing global supply chain management practices such as these requires an organization's internal departments and suppliers to reorient their operations so that they collaborate to pursue a common environmental goal. In other instances, organizations that implement environmental management systems build on their existing knowledge and proficiencies in pollution prevention (Darnall and Edwards, 2006) and therefore can more easily address the environmental impacts of their supply chain.

These organizations have invested in training their employees to improve the organization's environmental management and assess their production processes continually so as to eliminate inefficiencies. They also systematically evaluate and share knowledge about the organization's environmental impacts (Hart, 1995). By encouraging their employees to work together in teams and continually improve the organization's environmental performance (Kitazawa and Sarkis, 2000), companies may be able to leverage their pollution prevention skills and environmental knowledge toward other integrated forms of environmental management (Hart, 1995; Darnall and Edwards, 2006) such as green supply chain management practices. Environmental management systems therefore offer a management structure to support supply chain management decisions that affect the natural environment, and, consequently, organizations that have experience with environmental management system may find it easier to adopt green supply chain management practices because they require similar complementary capabilities. While global supply chain management activities are likely to involve greater contact with third parties than environmental management systems, which may require an additional skill outside of the environmental management system framework, the internal expertise required to assess product inputs appears complementary to both management practices.

## **2.6 Pressures for Adopting Environmental Management System And Green Supply Chain Management**

Other reasons why environmental management system and green supply chain management may be considered complementary management practices relate to the institutional pressures that encourage their adoption. Institutional pressures persuade organizations to undertake similar strategic actions (Hoffman, 1997; Scott, 2001) to increase their external legitimization (DiMaggio and Powell, 1983; Hoffman and Ventresca, 2002). Legitimate businesses are those whose actions are seen or presumed to be desirable or appropriate within some socially constructed system of norms, values, beliefs and definitions (Suchman, 1995). Applied to the decision to adopt an environmental management system and green supply chain management practices, the external pressures an organization endures to implement one practice may be similar in that they arise from regulators, markets and communities. Regulatory pressures are often associated with an organization's decisions to adopt an environmental management system (Darnall, 2003) and utilize global supply chain management practices (Birett, 1998). These pressures arise from threats of noncompliance penalties and fines (Davidson and Worrell, 2001) and requirements to publicly disclose information about toxic chemical releases (Konar and Cohen, 1997).

For instance, regulatory changes in automotive paints have pressed car manufacturers to require their suppliers to reduce their use of regulated chemicals in the production process (Geffen and Rothenberg, 2000). Additionally, pressures from regulators may encourage organizations to adopt proactive environmental practices in an effort to form collaborative relationships and explore more non-regulatory ways in which government can encourage greater environmental improvements (Andrews et al., 2003). These less coercive forms of regulatory pressure are becoming increasingly relevant as governments expand their programs that encourage environmental management system adoption and green supply chain management practices. In adopting environmental management systems and relying on green supply chain management practices, organizations may be able to communicate more effectively to government that they are committed to improving their environmental performance.

In addition to regulatory pressures, market pressures may influence an organization's decision to adopt environmental management systems (Darnall, 2003) and rely on green supply chain management practices (Rao, 2002; Gupta and Piero, 2003). Over the last ten years, market actors have been placing greater pressures on organizations to consider their impacts on the natural environment (Hoffman, 2000). Overall, 15 percent of US consumers routinely pay more for green products, and another 15 percent seek green products if they do not cost more (Ginsberg and Bloom, 2004). While these findings suggest that markets are creating opportunities for environmentally friendly organizations, the majority of consumers still are not influenced by a company's proactive environmental practices. However, these same customers may be persuaded to change their purchasing decisions if a company violates environmental laws or emits high levels of toxins (Prakash, 2000).

As a consequence, environmental management system and global supply chain management adoption may provide a vehicle for organizations to 'signal' to market participants that their environmental strategies adhere to or exceed generally accepted environmental standards. Doing so may lead to greater acceptance of the organization's strategic approach (DiMaggio and Powell, 1983) and insulate organizations from competitors' criticisms (King and Lenox, 2001). Environmental management system and green supply chain management adoption also may help organizations develop an environmentally conscious reputation. Such a reputation may invite patronage from consumers and generate opportunities for business with other organizations that value these principles (Darnall and Carmin, 2005). Finally, organizations are subject to pressures from the community that include environmental groups, community groups, the media, labor unions and industry associations (Hoffman, 2000). Each of these groups can marshal public support for or against an organization's environmental performance (Clair, Milliman and Mitroff, 1995; Turcotte, 1995).

Environmental management system and global supply chain management adoption may be one way for organizations to indicate to community stakeholders that their environmental management practices are sound. Doing so is increasingly important because community stakeholders often do not distinguish between an organization's environmental practices and the practices of its suppliers (Rao, 2002). In sum, environmental management systems and green supply chain management practices may be complementary because organizations that adopt them possess comparable internal competencies and endure similar institutional pressures. For these reasons, we hypothesize that environmental management system adopters are more likely to utilize green supply chain management practices.

## **3. RESEARCH METHODOLOGY**

This chapter introduces the methods and techniques the researcher used in collection of data and information which will enable the researcher to come out with a comprehensive analysis. The technique includes, the qualitative and the quantitative data. Methodology according to the "business dictionary" simply refers to the process used to collect information and data for the purpose of making business decision, which may include publication research, interview, surveys and other research techniques and could include both present and historical information.

### 3.1 Research Design

In order for the researcher to solicit for appropriate information regarding the performance of inventory systems in achieving customer demand, a case study of National Disaster Management Organization was used.

### 3.2 Sources of Data

With reference to the objectives of the research study, the researcher deployed the use of both primary and secondary sources of data to help gather appropriate and comprehensive information.

**Primary Data:** According to Larsen et.al. 2012, primary data is that data collected firsthand from respective sources such as: observations, experiments, questionnaires, and interviews.

**Secondary Data:** Secondary data consists of pre-existing data which have been used before on projects other than the current study. Starck et al., 2010. These are published data which are collected not necessarily for the precise decisions that the researchers using the data currently intend them for. They are add-ons to the intended primary data used. The study of documents articles and writes out on corporate social responsibility, referencing of published textbooks and knowledge drawn from intellectuals who have ample ideas about the topic under discussion

### 3.3 Population and Sampling

According to Henrick (2013), Population is defined as the complete set of individuals, objects or scores that a researcher is interested in studying. The worker population of National Disaster Management Organization is fifty 50, upon which the researcher targeted specific departments, with regards to the topic of the research study. Sampling procedure According to Starks and Roberts (2012), a sample is a subset of units or cases randomly selected from the population. From the targeted population of fifty (50) personnel, a simple random sampling was used to arrive at a percentage constituting twenty (20) respondents from the National Disaster Management Organization

### 3.4 Data Collection Method

The researcher used the required data collection tool which was primarily subjected and aligned to the design and objective of the study which is descriptive in nature. There are various methods through which information and data could be gathered and solicited, e.g. questionnaires, interviews, observations and experimentation. As part of the research analysis, the researcher deployed the use of questionnaires to help gather information regarding the research topic. Both open and closed ended questionnaires were used to solicit information from the target employees and personnel of National Disaster Management Organization. Open ended questionnaire required the targeted personnel to provide their own answer to questions whereas the closed ended questions which were well structured required the respondent to select their answers from among a list provided.

### 3.5 Qualitative and Quantitative Data

Both quantitative and qualitative data source was employed in the study. Quantitative analysis collects data that is factual and can be measured and considered statistically, (Copper & Schindler, 2006). The quantitative data was obtained from the questionnaire result and were analyzed, using the Spreadsheet (Microsoft Excel software) whiles the qualitative data was acknowledged from the respondents behavior, opinions, abilities, beliefs and so on. A quantitative approach is one in which the investigatory primarily uses postpositive claims for developing knowledge (i.e., cause and effect thinking, reduction to specific variables and hypotheses and questions) Babbies, (2006).

### 3.6 Data Analysis

With reference to the research data and methods, both qualitative and quantitative approach was used. The data collected has been categorized accordingly in order to make a meaningful and valid conclusion and relevant recommendations. It is on the presentation and analysis of data collected from the field of study. It shows the number of questionnaires administered, the numbers returned and the relative response rate. The qualitative data procedure required the use of statement and grammatical expressions to achieve vital information, such as the literature review from the existing document, whiles the quantitative research also required the use of statistics and mathematical deductions in analyzing data, for the example, the use of questionnaire and how the responses will be presented in a form of tables, bar charts and pie charts for easy analysis with the use excel.

## 4. DATA ANALYSIS & PRESENTATION

This chapter presents and analyzes in details the data collected from the questionnaire administered to the respondents in both qualitative and quantitative form to provide useful information. It thus involves the use of both



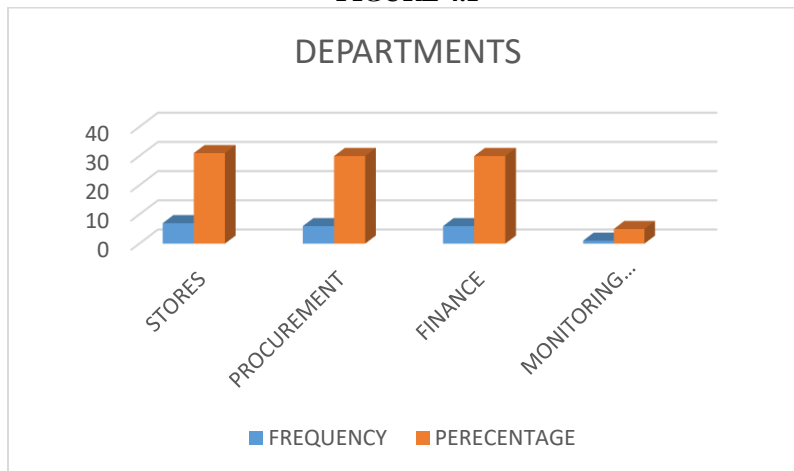
quantitative and descriptive analysis to transform the data into meaningful information. Statistical tool as tabulation was used in the analysis.

**Table 4.1 Respondents Department**

REPOUDENT	FREQUENCY	PERCENTAGE
STORES	7	35
PROCUREMENT	6	30
FINANCE	6	30
MONITORING AND EVALUATION	1	5
<b>TOTAL</b>	<b>20</b>	<b>100</b>

Source: Author's own field work, 2018

**FIGURE 4.1**



Source: Author's own field work, 2018

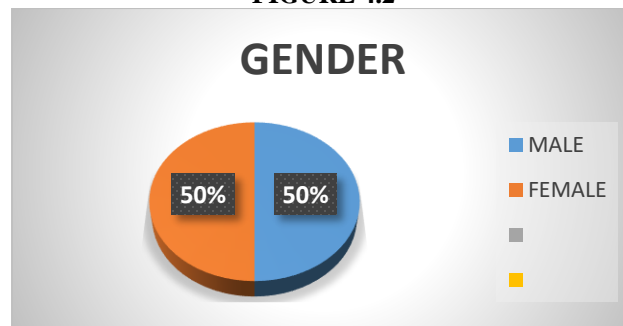
According to table 4.1, seven (7) respondents representing thirty five percent (35%) are under the stores department. Six (6) respondent representing thirty (30%) are under the procurement department, whilst six (6) respondent representing thirty (30%) are also under the finance department. Finally, one (1) respondent representing (5%) also under the monitoring and evaluation department.

**TABLE 4.2: GENDER**

RESPONDENT	FREQUENCY	PERCENTAGE
MALE	10	50
FEMALE	10	50
<b>TOTAL</b>	<b>20</b>	<b>100</b>

Source: Author's own field work, 2018

**FIGURE 4.2**



Source: Authors own field work, 2018

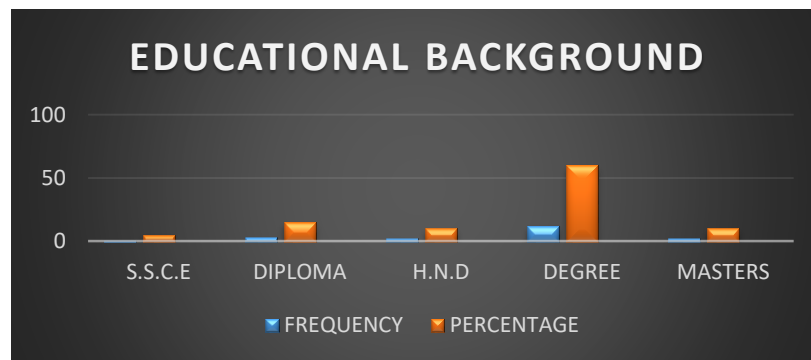
With reference to table 4.2, it is clearly stated that ten (10) respondent representing fifty percent (50%) are male whilst another ten (10) respondent representing fifty percent (50%) are females.

**TABLE 4.3: EDUCATIONAL BACKGROUND**

RESPONDENT	FREQUENCY	PERCENTAGE
S.S.C.E	1	5
DIPLOMA	3	15
H.N.D	2	10
DEGREE.	12	60
MASTERS.	2	10
<b>TOTAL</b>	<b>20</b>	<b>100</b>

Source: Authors own field work, 2018

**FIGURE 4.3**



Source: Authors own field work, 2018

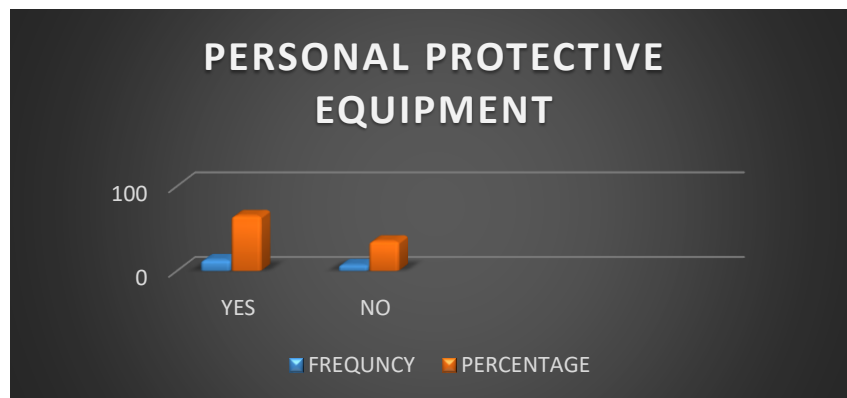
From table 4.3, one (1) respondent representing five percent (5%) S.S.C.E whilst three (3) respondent representing fifteen percent (15%) holds diploma as their current qualification. Two (2) respondents representing ten percent (10%) holds H.N.D, twelve (12) respondents representing sixty percent (60%) and of course the highest number holds degree while two (2) respondent representing ten percent (10%) holds masters.

**Table 4.4 Availability of Personal Protective Equipment**

RESPONDENT	FREQUENCY	PERCENTAGE
YES	13	65
NO	7	35
<b>TOTAL</b>	<b>20</b>	<b>100</b>

Source: Authors own field work, 2018

**FIGURE 4.4**



Source: Authors own field work, 2018

From the table above, thirteen (13) respondent representing sixty five percent (65%) agreed that personal protective equipment are available in the organization, whilst seven (7) respondents representing thirty five percent disagreed to the fact that, personal protective equipment are available in the organization. From the above table it is agreed that the organization is well equipped with the personal protective equipment. The availability of this equipment's will help improve on the dealings of the organization.

**Table 4.5: To Evaluate The Environmental Management System.**

	<b>STRONGLY AGREE</b>	<b>AGREE</b>	<b>NOT SURE</b>	<b>DISAGREE</b>	<b>STRONGLY DISAGREE</b>	<b>TOTAL</b>	<b>%</b>
my company considered using an environmental management system	1(5%)	12 (60)	4(20)	3(15)	0	20	100
my company assesses the environmental performance of suppliers	1(5%)	11(55%)	7(35%)	1(5%)	0	20	100
my company informs buyers on ways to reduce their environmental impacts	2(10%)	4(20%)	9(45%)	4(4%)	1(5%)	20	100
my company has environmental training programs in place for employees	2(10%)	12(60%)	4(20%)	2(10%)	0	20	100
my company benchmarks other organizations on environmental performance	3(15%)	4(20%)	11(55%)	4(20%)	1(5%)	20	100
My company does regular assessment on environmental management system.	2(10%)	8(40%)	5(25%)	4(20%)	1(5%)	20	100

**Source: authors own field work, 2018**

Table 4.5 is a comprehensive table with the objective evaluating the environmental management system in a Likert scale with options strongly agree, agree, not sure, disagree, and strongly agree. From the table above, one (1) respondent representing five percent (5%) strongly agreed that the company considered using an environmental management system, twelve (12) respondent representing sixty percent (60%) agreed that the organization considered using an environmental management system. Four (4) respondent representing twenty percent (20%) were not sure if the company considered using an environmental management system. Finally three (3) respondent representing fifteen percent (15%) disagreed that the company considered using an environmental management system. All environmental management systems involve establishing an environmental policy or plan; undergoing internal assessments of the organization's environmental impacts (including quantification of those impacts and how they have changed over time); creating quantifiable goals to reduce environmental impacts, providing resources and training workers; checking implementation progress through systematic auditing to ensure that goals are being reached; correcting deviations from goal attainment and undergoing management review (Coglianese and Nash, 2001). Based on Deming's (1986) continuous improvement model, environmental management systems are intended to help organizations embed environmental practices deep within their operational frameworks so that protecting the natural environment becomes an integral element of their overall business strategy (Shireman, 2003). From the above, it's seen that higher number of respondent agreed that the organization considered using environmental management system which has helped in the maintenance of the environment. Negatively, implementing all this was costly.

With the assessment of the environmental performance of suppliers one (1) respondent representing five percent (5%) strongly agreed that the company assesses the environmental performance of suppliers, eleven (11) respondent representing fifty five (55%) agreed that company assesses the environmental performance of suppliers, seven (7) respondents representing (35%) are not sure if the company assesses the environmental performance of suppliers. To conclude, one (1) respondent representing five percent (5%) disagreed that the company assesses the environmental performance of suppliers. Environmental performance of suppliers is highly considered in the organization, and that determines the kind of supplies being sent to the organization. Historically most organizations

rarely restrict their purchasing decisions to suppliers (at any level) with certain environmental criteria. But now is one of the most important criteria's given to suppliers. And this is helping so much in the supply chain activities.

Training programs are very much needed in organizations to help achieve their organizational goals. In this vein, two (2) respondents representing ten percent (10%) strongly agreed that the company has training programs in place for employees, twelve (12) respondent representing 60% agreed that the company organizes training programs in place for employees, four (4) respondents representing twenty percent (20%) are not sure if the company organizes training programs in place for the organization. Finally, two (2) respondents representing ten percent (10%) disagreed that the company organizes environmental training programs in place for employees. For example, within the US, the Environmental Protection Agency (EPA) is providing leadership in the development of environmental management systems and promoting wider adoption of environmental management systems across a range of organizations and settings (USEPA, 2001). This training programs helps increase the knowledge of workers.

Also with the table 4.5, two (2) respondents representing ten percent (10%) strongly agreed that the company does regular assessment on environmental management system, eight (8) respondents representing forty percent (40%) agreed that the company does regular assessment on environmental management system, five (5) respondents representing twenty five percent (25%) are not sure if the company does regular assessment on environmental management system and finally, one (1) respondent representing five percent (5%) disagreed that the company does regular assessment on environmental management system. There are numerous capabilities required to adopt an environmental management system that reduce the cost of adoption (Darnall and Edwards, 2006) and facilitate the implementation process. For instance, environmental management system adoption requires that an organization encourage its employees to work together, sharing their knowledge of the organization's internal operations in order to minimize impact to the natural environment (Hart, 2005). Regular assessment on environmental management system continually improve the organization's environmental impacts and extensive knowledge and monitoring of organizational resources, constraints, production capabilities and processes (ISO, 2001).

**FIGURE 4.6 Improve On Recycling Rate Through Waste Reductions**

	<b>STRONGLY AGREE</b>	<b>AGREE</b>	<b>NOT SURE</b>	<b>DISAGREE</b>	<b>STRONGLY DISAGREE</b>	<b>TOTAL</b>	<b>%</b>
My organization do recycle waste	0	1(5%)	9(45%)	6(30%)	4(20%)	20	100
My company assist with placement interior and exterior collection containers	2(10%)	4(20%)	7(35%)	6(30%)	1(5%)	20	100
Waste management is handled by professionals in my company	3(15%)	9(45%)	6(30%)	1(5%)	1(5%)	20	100
Recycling too costly	2(10%)	2(10%)	16(80%)	0	0	20	100
My company purchases product with recycling content	0	4(20%)	12(60%)	3(15%)	1(5%)	20	100
My company frequently trains staff on how to manage waste.	4(20%)	5(25%)	6(30%)	5(25%)	0	20	100

Table 4.6 with objective improving on recycling rate through waste reduction in a Likert scale with options strongly agree, agree, not sure, disagree, and strongly disagree. From the above table, one (1) respondent representing (5%) agreed that the organization do recycle waste, nine (9) respondent representing forty five percent (45%) not sure if the organization do recycle waste. Also, six (6) respondents representing thirty percent (30%) disagreed that the organization do recycle waste, finally, four (4) respondents representing twenty percent (20%) strongly disagreed to the fact that their organization recycles waste. With this, the recycling of waste is not considered in the organization because a large number of respondents are not sure if it is done in the organization.

Within the same context of objective, about the company assisting with placement interior and exterior collection containers, two (2) respondents representing ten percent (10%) strongly agreed that the company assists with placement of interior and exterior collection containers, four (4) respondents representing twenty percent (20%) agreed that that the company assists with placement of interior and exterior collection containers, seven (7) respondents representing thirty five (35%) are not sure if the company assists with placement of interior and exterior



collection containers, also six (6) respondents representing thirty (30%) disagree that the company assists with placement of interior and exterior collection containers. Finally, one (1) respondent representing five percent (5%) strongly disagree that the company assists with placement of interior and exterior collection containers.

With respect to waste management, three (3) respondents representing fifteen percent (15%) strongly agreed that waste management is handled by professionals in the company, nine (9) respondents representing forty five percent (45%) agreed that that waste management is handled by professionals in the company, six (6) respondents representing thirty percent (30%) are not sure if waste management is handled by professionals in the company, one (1) respondent representing five percent (5%) disagree to the fact that waste management is by handled professionals in the company, finally one (1) respondent representing five percent (5%) strongly disagreed that waste management is handled by professionals in the company. From the literature review, professional are so important in executing goals and thus helps create a positive impact. These organizations have invested in training their employees to improve the organization's environmental management and assess their production processes continually so as to eliminate inefficiencies.

With reference to the table 4.6, about the company purchasing product with recycling content, four (4) respondents representing twenty percent (20%) agreed to the fact that, the company purchases product with recycling content, twelve (12) respondent representing sixty percent (60%) are not sure if the company purchases product with recycling content, three (3) respondent representing fifteen (15%) disagreed that the company purchases product with recycling content, finally, one (1) respondent representing five (5) strongly disagreed that the company purchases product with recycling content. With respect to the literature review, it is well understood that product with recycling content is one of the best. And this help to prevent pollution and help create a sustainable environment.

**TABLE 4.7 To Help Promote And Create Awareness On Energy And Resource Conservation.**

	STRONGLY AGREE	AGREE	NOT SURE	DISAGREE	STRONGLY DISAGREE	TOTAL	%
My company assesses the level of consumption periodically.	6 (30%)	6(30%)	7(35%)	1(5%)	0	20	100
Lack of effective communication between management and staff on energy and resource conservation.	6(30%)	8(40%)	2(10)	4(20%)	0	20	100
My company deals with renewable energy.	0	1(5%)	16(80%)	2(10%)	1(5%)	20	100
My company organizes training for staff on the importance of energy conservation	0	10(50%)	7(35%)	2(10%)	1(5%)	20	100
My company uses energy efficient product.	2 (10%)	7(35%)	8(40%)	2(10%)	1(5%)	20	100
The maintenance culture on energy conservation is effective	0	7(35%)	6(30%)	4(20%)	3(15%)	20	100

**Source: authors own field work, 2018.**

From the table above with the objective to promote and create awareness on energy and resource conservation in a Likert scale with options strongly agree, agree, not sure, disagree, and strongly disagree. The table above indicated that six (6) respondents representing thirty percent (30%) strongly agreed that the company assesses the level of consumption periodically, six (6) respondents representing thirty percent (30%) agreed that the company assesses the level of consumption periodically, seven (7) respondents representing thirty five percent (35%) also not sure of the fact that the company assesses the level of consumption periodically, finally one (1) respondent representing five percent (5%) disagreed that the company assesses the level of consumption periodically. With this it is clear that the respondents are not certain if the organization assesses the level of consumption periodically. From the literature review assessing the level of consumption is key, because it helps identify the rate at which resources are being used.

With respect to lack of effective communication between management and staff on energy and resource conservation, six (6) respondent representing thirty percent (30%) strongly agreed to the fact that lack of effective communication between management and staff on energy and resource conservation is a challenge to the organization, eight (8) respondents representing forty percent (40%) agreed that there is lack of effective communication between management and staff on energy and resource conservation, two (2) respondents representing ten percent (10%) are not sure if there is lack of communication between management and staff on energy and resource conservation. The

authorities must see to it that there is effective communication between management and staff. Communication is highly needed in every organization and thus helps improve the operations in the organization. The literature review explained that, communication is the channel through which things are being done effectively and efficiently.

With respect to renewable energy, one (1) respondent representing five percent (5%) agreed that the company deals with renewable energy whilst sixteen (16) respondent representing eighty percent (80%) are not sure if the company deals with renewable energy, two (2) respondent representing ten percent (10%) disagreed to the fact that the company deals with renewable energy, finally, one (1) respondent representing five percent (5%) strongly disagreed to the fact that the company deals with renewable energy.

Finally, the effectiveness of maintenance culture on energy conservation was also taken into consideration, and thus, seven (7) respondent representing (35%) agreed that the maintenance culture on energy conservation is effective, six (6) respondent representing thirty (30%) are not sure if the maintenance culture on energy conservation is effective, four (4) respondents representing twenty percent (20%) disagreed that the maintenance culture on energy conservation is effective, finally, three (3) respondents representing (15%) strongly disagreed to the fact that the maintenance culture on energy conservation is effective. Energy conservation is very key in every organization, and according to the literature review is said to be maintained appropriately.

#### **TABLE 4.8 Challenges Of Implementing Environmental Management System And Green Supply Chain Management.**

Below are the possible answers given to the respondents on the challenges of implementing the environmental management system and green supply chain management?

- i. Difficult implementation of environmental management system and green supply chain.
- ii. Lack of responsiveness and flexibility by staff.
- iii. Unavailability of qualified personnel's
- iv. Lack of funds.

SELECTED ANSWERS	FREQUENCY	PERCENTAGE
I and ii only	2	10
I, ii and iii only	5	25
iii and ii only	0	0
All of the above	6	30
None of the above	7	35
<b>TOTAL</b>	<b>20</b>	<b>100</b>

**Source, authors own field work, 2018**

From the table above, it was indicated that two (2) respondents representing ten (10%) selected difficult implementation of environmental management system and green supply chain and lack of responsiveness and flexibility by staff as a challenge faced by the organization, five (5) respondent representing twenty five percent (25%) selected difficult implementation of environmental management system and green supply chain, lack of responsiveness and flexibility by staff and unavailability of qualified personnel's as a challenge faced by the organization, six (6) respondent representing thirty percent (30%) selected all the challenges as problems faced by the organization whilst seven (7) respondents representing (35%) selected none of the above as challenges faced by the organization.

## **5. CONCLUSION**

This chapter draws the outcome of the presentation made in chapter four. It concludes on the findings received from the questionnaires administered to the respondents. Conclusions and recommendations made by the researcher can also be found in this chapter.

### **5.1 Findings**

From the investigation, a number of concerns on environmental management system and green supply chain management were revealed. The findings have been summed up bellow; Due to the complexities and the nature of the research study, the researcher listed the following findings and targets established.

- Reduction of wastes and improvement of recycling rates
- Promotion of energy and resource conservation

- Proper control of chemical substances
- Development of environmentally benign product

To achieve such findings and targets, we have developed and are implementing an environmental management system. This entails preparing an environmental management program that specifies responsibilities, means, and schedules among other matters and periodically monitoring, measuring, and keeping records of key operational variables.

## 5.2 Conclusion

In sum, this research reveals that organizations that adopt environmental management systems EMSs more frequently implement green supply chain management GSCM practices, regardless of how long the EMS has been in place. These results suggest that EMSs and GSCM may complement each other, and that EMS adopters have a stronger probability of improving the environment not just within their organizational boundaries, but throughout their network of buyers and suppliers. The net effect may be an overall increase in environmental sustainability, since mechanisms are in place to enhance network-wide environmental performance.

## 5.3 Recommendations

In the light of the findings and conclusions, the following recommendations are hereby proposed:

**Implementation of environmental management systems:** Efforts must be made to implement those environmental management systems and green supply chain management which are not being effectively practiced and this is a problem in the organization. This problem can be solved by making policies that needs to be abided by the managers and all the employees so as to help improve on organizational performance.

**Employment of quality functional deployment:** There is the need to employ quality functional deployment of which this is a problem in the organization. This can be done by employing expertise who can measure quality, this will enable quality systems to be built on customer needs and wants and also exceed customer expectations. When this is done it will help in addressing the issues of poor customer relations as well as prevent loses of customers as a result of not meeting customers' expectations.

**Subscribe to quality standards/awards and subscribe to a quality award system:** It is highly recommended that company should subscribe to a quality standards/awards or subscribe to a quality award system. For instance it should subscribe to ISO certification of which this be done by making sure the organization has met all the standards and what it takes to subscribe. This can help them to put in place all the measures as well as implement EMS and GSCM. This will go a long way to boost customer confidence all over the world in the products of the company.

**Motivation of staff:** Another recommendation is that green supply chain management and environmental management efforts in NADMO should be appreciated. There should be systems for recognition and appreciation of implementation of these systems in order to motivate the staff to work effectively. When this is done, it will motivate the employees to work more in order to achieve a common goal.

**Purchase of modern equipment:** There is the need for the company to purchase modern equipment. This can be done by going through the procurement process when making any purchases. Also, modern equipment can be acquired when the purchasing team seek the concerns of the user department. This would make the organization more effective and efficient and also help reduce the cost of providing service.

This study recommends that future studies test the effects of the other elements of environmental management system and green supply chain management (process-centeredness, integrated system, continual improvement, strategic and systematic approach, fact-based decision-making and communication) on organizational performance were not part of this study.

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