Influence of Perceived Business Benefits on Adoption of Green Supply Chain Strategy by Manufacturing Firms in Kenya

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Abstract:
The purpose of this study was to assess the influence of perceived business benefits on adoption of green supply chain strategy by manufacturing firms in Kenya. Green issues are top on the global agenda with governments and corporate are setting out to identify ways of achieving environmental excellence and at the same time achieve economic and social excellence. An empirical study of 80 respondents drawn from the directory of Kenya Association of Manufacturers through multistage sampling method and analysis of data through logistic regression, led to the conclusion that perceived business benefits was a driver of adoption of green supply chain strategy. There were three top influencers including competitive advantage, operational and cost efficiency and customer- supplier relationships.

Keywords: Perceived business benefits, green supply chain strategy, manufacturing firms

1. Introduction

The era of the Industrial Revolution spanning early 19th century to 1950, resulted in shortages that were marked with inventiveness and innovation resulting in mechanization of manufacturing processes, which led to some negative impacts on the environment. From the economic point of view, growth in industrialization leads to increase in economic growth and this triggers population growth and consequently consumption increases without expansion of the natural resources or space. The green revolution has and it is likely to affect every business activity in future and increasing attention towards environmental matters calls the firm to react and adapt its strategy to the new issue (Tutore, 2010).

The environmental pressures (drivers) that affect a business may come from sources inside and outside the firm. External sources include industry requirements (customers and suppliers), financial institutions, regulatory authorities and public bodies (local, regional, national and global). Internal pressure includes desire of marketing departments to 'green', the legal mandates of health and safety inspectors, fiduciary stewardship concerns of board members and employees desire for green environment. Overall strategy should be designed to address all this (Cousins, Lamming, Lawson, & Squire, 2008).Supply chain input resources such as fuel, energy, natural resources and consequently, pressure from the stakeholders, deserve close attention in order to determine the influence of some drivers and trends that have an impact on an organization's supply chain (Centikaya, 2011). Literature citing green issues varies from highly developed countries to least developed. Most researchers cited are those from Europe and United States and China is following closely with Africa occupying the lowest position (Large, Chiou & Cetinkaya, 2011).

1.1. Statement of the Problem

Green issues are top of global agenda with the result of a myriad strategic approaches being adopted by firms to overcome the challenge and to gain competitive advantage. The interaction of a firm with the environment can be viewed in four ways, which include; the firm and its survival, the immediate business environment, the society in which it operates and the natural environment which is the source of its livelihood. Kenya vision 2030 in assessing the impact of external environment envision that the growing world economy and population offers an expanded potential market for Kenyan products, but literates that other global economic

trends such as out sourcing, environmental concerns and increased demand for raw materials are likely to impose greater competition for countries like Kenya (Republic of Kenya, 2008). As ecological and social responsibility become increasingly important to the society, managers' values and perceptions on environmental issues would be shaped by the dominant norms of the society towards environmental protection, which in turn would generate positive managerial initiatives by a firm's environmental management (Wenwei & Kang, 2011). Empirical evidence shows that in Kenya, firms, the government and environmental campaigners have undertaken various green initiatives but there are no studies typical of a green supply chain model. In spite of the high potential of a green supply chain strategy to help overcome green issues and voicing of improved industrialization for economic growth, the adoption of a green supply chain strategy as a means of addressing green issues impacting the manufacturing sector in Kenya does not seem to have any study. A key question arises as to what contributes to adoption of green supply chain strategy in light of green issues facing firms in Kenya.

1.2. Research Objective
To assess the influence of perceived business benefits on adoption of green supply chain strategy by manufacturing firms in Kenya

1.3. Hypothesis
H0= Perceived business benefits do not influence adoption of green supply chain strategy by manufacturing firms

2. Literature Review
The literature reviews the problem of drivers of adoption of green supply chain strategy by manufacturing firms. The chapter begins with theoretical evidence of adoption of green supply chain strategy, driven by demand for firms to become environmental friendly (green). Empirical evidence drawn from developed and developing countries forms part of this literature review.

2.1. Theoretical Framework
Literature shows that the problem of scarcity, increased industrialization, increasing awareness of the consumers about environmental issues, business, households and governments want for green products push firms to adopt strategies that integrate environment (green issues) with business aspects (supply chain) in order to overcome the challenge (EITayeb, Zailani, & Jayaraman, 2010).Theory states that Supply Chain Management (SCM) is the conduit through which value is created and delivered, thus a green strategy embedded in a firm's operations and supply chain management ultimately minimizes a firm's total environmental impact from start to finish of the chain and from beginning to the end of the product life cycle. SCM deals with total business process excellence and adding "green" component involves addressing the influence and relationships of SCM to the natural environment (Zhu, Sarkis, & Geng, 2005).

2.2. Value Chain Theory
Studies review that a well-executed supply chain strategy result in value creation for the organization. Yuanqiao and Mullai (2008) refers to "Value chain" as "supply chain" from a focal company's perspective. Lepak, Smith and Taylor (2007) postulate that "use value" relates to the quality of a product or service as perceived by the customer according to his or her needs. In a supply chain perspective, this implies that each actor in the chain creates use value offered to the downstream customer who exchanges a monetary sum based on perceived value of the offers. Value may be captured depending on the firm's ability to leverage its resources for building a competitive position. A major stream of research dominates the Supply Chain Management (SCM) strategy literature with emphasis on the effect of competences, capabilities, strategy formulation and implementation on firm's performance (Bolo, 2011). The study was based on Porter's value chain model, with the conclusion that SCM provides an environment where core competencies, strategy and strategy implementation process, core capabilities can be linked effectively within the value chain to enhance corporate performance. Theory states that SCM is the conduit through which value is created and delivered, thus a green strategy embedded in a firm's operations and supply chain management ultimately minimizes a firm's total environmental impact from start to finish of the chain and from beginning to the end of the product life cycle.

2.3. Systems Theory
System theory stresses the effects of external systems on the decisions and behavior of an organization; where external systems include regulations, the law, professional standards, interest organizations and social belief. System theory characterizes the effects of external pressure on organizational structure (Chien, 2007). The public is increasingly becoming environmental conscious and in addition to the statutory requirement due to government policies and regulations, and pressure from organized groups many companies are expected to be swayed towards adopting a green manufacturing or environmental management system policy.

2.4. Institutional Theory
Institutional theory is relevant to the adoption of environmental practices because firms operate in a way that meets social and legal expectations and that not all business choices are as a result of rational economic decisions (Tate, Dooley and Ellram, 2011). Zailani and Wooi(2010) envisage that certain key drivers motivate firms to adopt green supply chain initiatives/strategy, and from a theoretical perspective, the effect of the drivers can be explained in terms of the institutional theory. The drivers studied include regulations and customers' pressures considered as coercive isomorphism, social responsibility considered as normative isomorphism and expected business benefits considered as cultural-cognitive isomorphism. Zhu and Sarkis (2007) utilized institutional theory to

evaluate how various green supply chain management practice adoptions influenced operations and manufacturing management. The institutional pressures they studied include: normative (market) pressure where firms conform to be perceived as more legitimate, coercive (regulatory) pressure which occurs through influence exerted by those in power and mimetic (competitive) pressures which occur when firms mimic the actions of successful competitors in the industry. Literature reviews four types of green supply chain strategies which eminently match the challenge as risk-based strategies, efficiency-based strategies, innovation-based strategies and closed loop-loop strategies (Simpson and Samson, 2008).

2.5. Stakeholder Theory
Stakeholder is a theory of organizational management and business ethics that addresses morals and values in managing an organization. The basic proposition of stakeholder theory is that a firm's success is dependent upon the successful management of all the relationships that a firm has with its stakeholders (Umalomwa & Jafaru, 2012). The internal stakeholders who include employees, managers and owners react differently from the external stakeholders to the same stimuli. Supplier-manufacturer relationships are considered important in developing a sustainable competitive advantage for the manufacturer (Sheth and Sharma, 1997).

2.6. Conceptual Framework
Ecological and 'green' issues are a strategic theme in purchasing and supply and aspects considered for a typical manufacturing firm include; products designed and purchased, packaging materials, production processes, natural resources exploited and problems associated with creating and disposal of waste. Adoption of green supply chain strategy is sum total of at least four supply practices which include green purchasing, green production, green marketing and reverse logistic (Sarkis, 2005). Institutional theory, systems theory and shareholder theory explain the drivers of adoption of green supply chain strategies, hence the independent variables. This conceptual framework serves to explain how manufacturing firms respond strategically to green issues affecting their operations across the entire supply chain. Figure 1 give a schematic representation of the relationship between the driver and adoption of strategy.
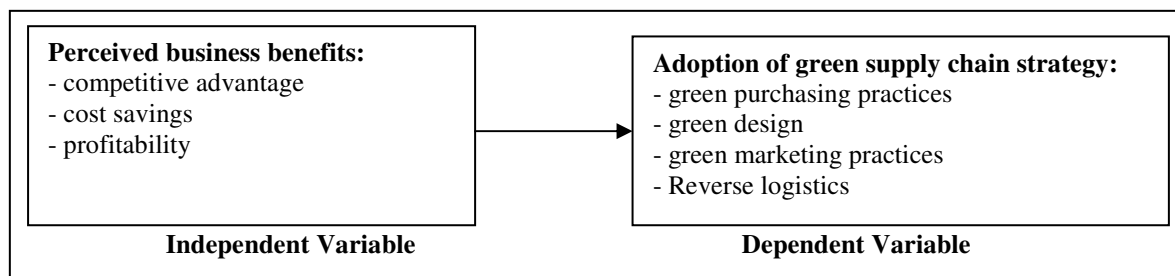

Figure 1: Conceptual Framework

Supply Chain Management like other disciplines relies heavily on concepts, definitions, theories, rules and principles of other disciplines. Understanding a firm's strategic Supply Chain Management focus sets a level ground for evaluating its responsiveness towards the adoption of green supply chain strategies to mitigate negative environmental impacts and business downturn (Sachan and Datta, 2005). In terms of ontological thinking, the interaction of a firm with the environment can be viewed in four ways, which include; the firm and its survival, the immediate business environment, the society in which it operates and the natural environment which is the source of its livelihood (Oral, 2009). External variables identify drivers of environmental pressures as those relating to cost control, total quality management, communities, investors and environmental regulations. The same environmental drivers do not affect a company's pattern of environmental behavior in equal measure and their influence depends on industry-and country-specific factors (Azzone and Coci, 1998).

2.7. Perceived Business Benefits
The company's environmental culture represents one of the most important determinants in the definition of the environmental strategies, which depends on the company's history, the fields where it operates and the country in which it has the headquarters or its plants. Thus, each firm, according to its own strategic orientation decides whether or not to include environmental factors into the overall process of strategy formation (Azzone et al., 1997). A manufacturer is the one who designs and develops the product or packaging, as well as choosing the materials for that product or package. It is at this point that the most efficient and effective decision can be made to reduce waste and encourage reuse. Reduction and recycling is at the product design and development stage, a point in the product's life cycle when crucial decisions can be made to minimize the environmental impact of their product (DANIDA, 2005).Theoretically, greening supply chain is a win-win solution on both limitations of environmental damages caused by a certain supply chain and delivering benefits for companies along the chain. Literature supports the theory that firms adopting GSC strategies show positive correlation in lowering operational costs and improvement of its environmental performance (Zailani, 2010). The value chain theory supports the notion that perceived benefits may contribute to adoption of GSC strategy.
Pressus (2009) envisage that the strategic, transparent integration and achievement of an organization's social, environmental and economic goals in the systematic coordination of key inter-organizational business processes lead to improvement of the long-term economic performance of the individual company and supply chain. With regard to internal drivers coming from specific organizational features, green management literature recognizes the ethical attitude and the economic opportunities coming from the

adoption of green proactive strategy. Sometimes the economic opportunities represent important drivers toward ecological responsiveness which include lowering cost through reducing the cost of input and waste or gains from green marketing, or with the sale of waste disposal or by increasing product quality and corporate reputation (Benito, 2006).

Competitive advantage is another benefit associated with greening of supply chains. Theory postulate GSCM as an environmental-friendly concept of the manufacturing system. In pursuance of competitive advantage edged on efficiency, quality, innovation and customer response, enterprises in operation and production employ new methods such as product kinds, production processes, management system, organizational structure and corporate formed structures (Chien *et al,* 2007).The authors envisage that the increasing pressures on organizations and nations in attempting to steadily increase productivity, against increasing competition, diminishing raw materials coupled with growing concern for negative effects of industry due to ecological damage caused by many industrial processes, calls for industries and nations to take a fresh look at productivity and formulate new strategies for managing operations. They advocate for green productivity that searches for clean technologies and strategies to manage production innovatively but responsibly and on a more sustainable competitive basis. Strategies that take into consideration reverse logistics have superior logistics model where cost of transportation is kept at a bare minimum, savings are realized from packaging, and re-use and product take back. Srivastava *et al* (2007) argues that profitability and cost reduction are some main motivators for businesses to become 'green' in the supply chain.

2.8. Research Gaps

The impacts of the environment are transmitted through the supply chain and a gap exists as the concept is not fully understood by most in developing countries as reviewed by literature available. Even in developing countries where the concept began, few success stories have been documented and environmental problems are top on the agenda. A survey carried by PWC that considered 200 workers and 200 representative groups and companies in China, Honduras, India, Kenya, the US and Europe noted that codes of conduct were insufficient to achieve sustained improvements on their own, requiring the implementation of capacity building and worker empowerment programs and that suppliers have an insufficient understanding of the business benefits associated with making required investments in CSR (Robinson and Strandberg, 2008). In assessing the drivers of adoption of green supply chain strategies particularly CSR and perceived benefits, most studies have not factored this shortcoming though it could have an implication on the results of the study.

There is great concern for manufacturing firms globally as well as locally, to deal with increased global warming and carbon emissions and embrace sustainable or eco-friendly practices. This affects the entire firm, but more so it impacts the firm's supply chain. Empirical evidence through study that sort to establish the relationship between the green supply chain strategy employed by the large manufacturing firms in Nairobi and their sustainable competitive advantage, found out that, large manufacturing firms in Nairobi had gained and sustained greater competitive advantage, in terms of goodwill, market share, returns on investments and even profitability, as a result of implementing green supply chain strategies (Katua, 2012). This study targets only registered manufacturing firms with Kenya Association of manufacturers agency as at 2013 leaving a myriad firm with a different or similar research agenda.

3. Methodology

The chapter expounds on the research design, target population, sampling frame, sampling techniques, methods of data collection, procedure for data analysis and presentation. To explain some causal relationships anticipated in respect of drivers of the adoption of green supply chain strategy by manufacturing firms, survey research design was being explored. Surveys help quantify social phenomenon particularly of issues, conditions and problems that are prevalent in society (Mugenda, 2008).The method of choice for portraying all the variety of a large heterogeneous population is that of sample survey (Shaughnessy, Zechmeister, & Zeichmeister, 2003). The manufacturing firms in Kenya are heterogeneous even within the 12 sectors. The large manufacturers in Kenya are subject to environmental regulation which in Kenya is the Environmental Management Coordination Act (1999), trade Acts and pressure from the market and other stakeholders. Perceived business benefits were assessed in relation to adoption of green supply chain strategy. The study combines issues related to the environment (green issues) and business aspects (supply chain), and therefore the target respondents were those with some knowledge about the two aspects who included officers in procurement and supply chain department, strategic management/environmental managers, marketing department and production and operations department.

The study adopted a mixed research design where qualitative approach was used for the benefit of measuring the perception and expert capability of business managers to identify green issues that are a prerequisite to development and implementation of green supply chain strategy. Qualitative data are a source of well grounded, rich descriptions of processes in identifiable local contexts and can preserve chronological flow, review which events led to which consequences and derive fruitful explanations, hence helping researchers to get beyond their initial perceptions (Miles and Huberman,1994). The attitude of management towards adoption of green supply chain strategy was assessed using qualitative measures. The quantitative approach made use of numerical measurements such as the costs related to compliance to regulations, profitability and number of years since adoption of GSCS by firms. The study's aim was to assess the attitude of the firms in relation to the green issues affecting the globe and by extension their businesses.

3.1. Target Population

There were 698 members registered in Kenya Association of Manufacturers directory as at December 2013 who represent all the 13 categories, with one in the service sector hence outside the subject of our study. All members face challenges (green issues) bordering

on compliance with law on environment, standards, market expansion and quality and cost of energy and water, in addition to legislation of dumping and entry of counterfeits (KAM, 2012).

3.2. Sampling Frame
To ensure adequate coverage of the population of the large manufacturers in Kenya and ease of access, the sample frame consisted of KAM registered members within Nairobi and its surrounding areas as per the 2013 KAM directory. Nairobi has heavy concentration (80%) of these manufacturers' in its industrial areas rendering it an ideal target location with a population of 441firms. This led to a sample frame of 441 firms already defined into subsets. The firms cut across the 12 manufacturing sectors, each sector exhibit different characteristics and they benefit from KAM's prerogative to create environmental awareness and receive assistance to comply with the law and environmental stewardship.

3.3. Sample size and Sampling Technique
A large sample size has the benefit of reducing the degree of multicollinearity especially where the sample population is heterogeneous as is the case with this study target population (Kennedy, 2008). Multistage sampling technique was used to select a sample size of 80. The first stage entailed random selection of five sub-categories (clusters) from among the 12 sectors since strategy adoption is a matter of strategic choice. In this stage random number 18 obtained from the table of random numbers led to the selection of five strata with random numbers 01, 03, 04, 09 and 10 which were namely; Building and construction, Energy, electrical and electronics, Food and beverage, Pharmaceutical and medical and Plastics and rubber.

3.4. Research Instruments
Questionnaires allow data to be standardized thus enabling easy comparison (Saunders, Lewis and Thornbill, 2009). This instrument was used as the main one for this study because it allowed for pretesting, reliability and consistency in addition to cost and time factor. The questionnaires contained two major sections, the items affecting the adoption of GSCS (drivers) and practices corresponding to adoption of GSC strategy.

3.5. Data Collection Procedure
The questionnaires constitute the tool of data collection targeting managers in procurement/supply chain, environmental management, production or marketing/strategic management. The instrument was designed in such a manner to permeate appropriate measurements of the dependent and independent variables. The dependent variable in this study is adoption of green supply chain strategy. The measures for this variable include green purchasing strategies in acquisition of materials, green manufacturing or DFE, green marketing strategies and reverse logistics, hence the green supply chain strategy concept. The independent variable, which constitute pressure or motivators (drivers) for firms to adopt the green strategies across the supply chain assessed was perceived business benefits. The survey items were grouped under the variable where questions were answered using a five-point Likert-type scale, open, and closed-ended questionnaires. Zhu *et al* (2007), EITayeb *et al* (2009), and (Vachon, 2007) used Likert scale parameters to study GSC pressures/drivers and practices in China.

3.6. Pilot Study
10 firms drawn from KAM list of manufacturers through convenience sampling, and the questionnaires were distributed through drop and pick method. The results of the pilot study were analyzed for reliability by testing for internal consistency using Cronbach's Alpha test which yield a result of 0.91. Alpha coefficient of 0.7 or above is an acceptable reliability coefficient to advance the use of the instrument after the pilot study.

3.7. Data Processing and Analysis
A review of SCM and logistics research revealed that, behavioral and economic approaches influence the researches hence the prevalence of positivist method. There is limitation of quantitative methods because of interdependence among supply chain hence the need for triangulation (Sachan et al, 2005). Based on the conceptual framework the independent variable was analyzed so as to determine the effects of the variable on adoption of green supply chain strategy by manufacturing firms and to assess the effects of alternative future scenario.

First, in order to provide a description of the sample from which data was collected, descriptive information of the category of the firm, size, supply chain function, and green practices were described, as well as the means, modes, median and standard deviations of drivers and adoption of the strategy. Factor analysis was performed on grouped scale items of the variables to ascertain their level of significance in the study. The dependent variable of this study is categorical hence the need to model the empirical data obtained and also normalize. Logistic regression and correlation analysis are popularly used to infer influences of strategic decision making in SCM, but despite correlation analysis being good in overcoming the problem of multicollinearity it ignores the co-existence of other attributes (Sachan et al, 2005). The event (adoption of GSCS) in this study is stochastic hence a dichotomous dependent variable (Y). The questions structured in five-point Likert-type scale were in form of ordinal data which were transformed to interval measures. Logistic regression analysis examines influence of various factors on a dichotomous outcome by estimating the probability of the events occurrence. Logistic regression was used to examine the relationship of the variable (driver) and the log odds of adoption of GSCS which was a dichotomous outcome obtained by calculating the changes in the log odds of the dependent variable as opposed to

the dependent variable itself. The likelihood function was used for estimating the probability of the data collected on the assumption that the probability of the observed values of the dependent variable would be predicted from the observed values of the independent variable.

The model took the form presented below:

- ➢ $\ln(Y) = \alpha_0 + \alpha_1 X_1 + e$. Where,
- ➢ Y= the odds ratio - adoption of green supply chain strategy.
- ➢ 1= those adopting the strategy, and 0 denotes otherwise
- ➢ $\ln(Y)$= natural logarithm of the ratio of the odds ratio
- ➢ X_1= Perceived Business Benefits
- ➢ α_1= the coefficient, α constant and e, the error term.

4. Research Findings and Discussion

The survey questionnaire was structured into four major sections namely; demographics which collected data on sector and firm size, the predicted driver, the green supply chain practices The instrument was formulated with a combination of a five point Likert scale and other nominal and ordinal scales in addition to open ended questions. The dependent variable instrument was designed to collect categorical data which was collapsed to two categories, that is, those scoring 5 and 4 (highly and high) in respect of adoption of GSCS and 3, 2 and 1 (moderate, rarely and not at all) for those categorized as not adopting. Index measures to assign value based on how much of the concept being measured is associated with an observation is an appropriate approach (Zikmund et al, 2010).The measure of central tendency for this study was median and the frequencies of the ordered scores were presented in percentages. Median is the most appropriate locator of center for ordinal data since it is resistant to extreme scores, thereby making it a preferred measure for Likert type data wherefore the distributions are not normal (Cooper et al., 2011).

4.1. Descriptive Results

4.1.1. Business Sectors and Title of Officer Involved in Supply Chain/Environment

This study targeted five sectors namely Building and Construction, Energy, Electrical and Electronics, Food and Beverage, Pharmaceutical and Medical, and Plastics and Rubber. The firms were randomly identified from a pull of twelve sectors excluding the services sector which was outside the scope of this study. Questionnaires were distributed proportionately and all those surveyed in Building and Construction and Energy, Electrical and Electronics responded. Food and beverage had the highest proportion but this sector is highly heterogeneous and one of the few sectors that relied on raw material produced locally. The survey reveals that those who filled the questionnaires were in management and most of them had a role in either Procurement/Supply Chain, Production or Environment.

4.1.2. Firm size

The size of the firm was assessed by two parameters which include number of employees and annual turnover. The results of our study reveal that 2/3 of the firms surveyed employed more than 100 employees, while 80 percent of the firms had an annual turnover of above Kenya shillings 200 million. Kenya is not highly industrialized and most manufacturing firms require large numbers of human labour. The size also affects decision making and scope of the operations. This variable aimed to assess the influence of strategic actions construed to yield business gains if adopted.

4.1.3. Perceived Business Benefits

Theoretically businesses pursue strategies that yield economic gains and for survival. Green supply chain strategy combines economic performance, social and environmental performance. To assess the contribution of this driver on adoption of green supply chain strategy by manufacturing firms in Kenya, empirical study was carried and evaluated through Likert scale measure. The median and percentage response for attitude measure were obtained as tabulated on Table 1.

Perceived Business Benefits (extent of influence to adopt where 5 is very high and 1 not at all)	Very high	High	Moderate	Low	Not at all	Median
i. Operational efficiency and cost effectiveness	32.9	35.7	18.6	7.1	5.7	4
ii. Marketability of green products	22.9	30.0	27.1	10.0	10.0	4
iii. Easy access to foreign markets	24.3	11.4	28.6	11.4	24.3	3
iv. Competitive advantage	41.4	27.1	22.9	4.3	4.3	4
v. Improved customer-supplier relationships	38.6	28.6	24.3	5.7	2.9	4
vi. Receiving innovative green/environmental awards	14.3	22.9	27.1	18.6	17.1	3
vii. Earning of carbon credits – to what extent do you consider it important	14.3	14.3	32.9	7.1	30.0	3
Average percentages	**27.6**	**24.3**	**25.9**	**9.1**	**13.5**	

Table 1: Influence of Perceived Business Benefits

4.1.4. Operational Efficiency and Cost Effectiveness
Operational efficiency was postulated as one of outcomes of adopting a green supply chain approach. The study results give a median of 4 implying that most of the respondents associated efficiency with green practices. The proportion of those agree to this proposition is 68.6 % at very high and high. Only 12.8% felt that no performance would not improve.

4.1.5. Marketability of Green Products
Empirical evidence reveal that more than half of the firms surveyed agreed to a very high and high extent that green products were marketable. Only 20%viewed this as a weak driver.

4.1.6. Easy Access to Foreign Markets
Assurance of a market for your produce is a strong driver of change. In an economy like Kenya who's the best exchange earner is agricultural produce, seeks strategies that match the requirements of the foreign market. This study reveals that only 35.7% with a median of 3 felt that access of foreign market was a driver of adoption of a green strategy.

4.1.7. Competitive advantage
Competitive advantage posted the highest popularity where 41.4% of the respondents indicated very high influence and combined very high and high yielded 68.5%. Those with a contrary view were only 8.6%.

4.1.8. Improved customer-supplier relationships
Good customer-supplier relationship is a desirable attribute by most business enterprises. This study reveals 67.2% of the respondent agreed to very high and high extent that their business strategic decisions took cognizance of this aspect. 8% only were of the contrary view.

4.1.9. Receiving innovative green/environmental awards
The study shows that 37.2% associated adoption of green strategy with awards. The median of 3 indicates that this was an average response.

4.1.10. Earning of carbon credits
30% of the respondents indicated that that carbon credits were of no significance. 14% however appeared to benefit from this approach. The respondents cut across different sectors including Energy and Electrical who have been known to benefit more from carbon credits in Kenya.

4.1.11. Profitability
This study revealed as represented by the 50 firms that affirmed this in response to a question seeking to explore whether firms realized any benefits since adopting a green strategy. Forty firms out of the seventy responded in the affirmative that they had recorded some profits since adoption of green supply chain strategy. Where measureable, the highest growth in profits noted from the results lay between 6 and 15 percent.
The highest mean frequency is 3.14 followed by 3.0, 4.0 and then 4.29 which is consistent with the median results. These results show that the highest number of respondents concur with the notion that perceived business benefit contribute to adoption of green practices. Factor analysis performed show that all the factors studied were relevant to this study since least score was 0.578 against a cut-off of 0.4

4.1.12. Green Projects and Practices
Adoption of green supply chain strategy was obtained through evaluation of extent to which firms practiced sixteen attributes of green supply chain mix. The results are illustrated in Table 2 below.

Green projects and practices	Very high	High	Moderate	Low	Not at all	Median
i. Eliminate/reduce hazardous /toxic materials from products	37.7	27.5	11.6	11.6	11.6	4
ii. Eliminate/reduce hazardous /toxic chemicals from manufacturing processes	38.6	30.0	8.6	7.1	15.7	4
iii. Implement design for environment practices in product development and to reduce manufacturing waste	32.9	28.6	24.3	4.3	10.0	4
iv. Reduce energy consumption in manufacturing and buildings	41.4	27.1	14.3	11.4	5.7	4
v. Increase the use of renewable energy sources e.g. solar, wind, geothermal	24.3	24.3	28.6	4.3	18.6	3
vi. Optimize transportation operations to reduce carbon footprint	25.7	28.6	22.9	11.4	11.4	3
vii. Recycle retuned products or scrap material	35.7	24.3	15.7	10.0	14.3	4
viii. Reduce packaging	21.4	25.7	22.9	11.4	18.6	3
ix. ISO certification e.g. ISO 14001, ISO 22000 and ISO 9000:2008	27.5	23.2	18.8	15.9	14.5	4
x. Improved capacity utilization	24.6	31.9	26.1	8.7	8.7	4
xi. Increased campaign for green products, processes and activities e.g. tree planting	24.3	27.1	25.7	8.6	14.3	4
xii. Use of green criteria in technical specifications of contracts	14.5	23.2	29.0	20.3	13.0	3
xiii. Ethical and responsible tendering approaches	31.4	21.4	20.0	18.6	8.6	4
xiv. New company environmental policy	28.6	20.0	31.4	10.0	10.0	3
xv. Participation in award winning environmental programmes	25.7	17.1	25.7	20.0	11.4	3
xvi. Increased green awareness training and campaigns	25.7	17.1	31.4	18.6	7.1	3
Averages percentages	**28.6**	**24.8**	**22.3**	**12.0**	**12.0**	

Table 2: Adoption of Green Supply Chain Strategy

The above results support the notion that green supply chain practices represented by the sixteen factors scored relatively well and it can be construed that Kenya manufacturing firms have adopted green supply chain strategies to some extent. The study reviews that out of factors considered five had outstanding response where combined very high and high is above 60 percent. These include; eliminate/reduce hazardous /toxic materials from products, Eliminate/reduce hazardous /toxic chemicals from manufacturing processes, implement design for environment practices in product development and to reduce, or repurpose manufacturing waste, reduce energy consumption in manufacturing and buildings and recycle retuned products or scrap material. Overall 53.4 percent responded to very high and high in respect to the practices that constitute GSCS.

Factor analysis was performed to help eliminate factors that did not have considerable contribution, but the outcome was positive for all items considered since they were above 0.555. After factor analysis, average means were computed and the results which fell between 4 and 2.5 were consistent with the median an indication that despite the heterogeneity of the firms studied , certain factors were viewed by the respondents the same way.

4.1.13. Binary Logistic Regression

Regression analysis helps a researcher to understand both the strength of the relationship and the impact of the independent variable on the dependent variable (Johnson, 2010). Logistic regression for instance gives an opportunity to predict factors not included in the survey sample as was revealed to some extent by some of the open ended questions responded to in this study on drivers of adoption of GSCS. Logistic regression allows the researcher to predict a discrete outcome from a set of continuous, discrete, or dichotomous (Sekaran and Bougie, 2009). GSCS adoption is choice manufacturing firms have to make faced with the dynamics of the business environment in which they operate, moreover, those that relate to green issues. The assessment of the ratio of the probability of adopting to the probability that a firm will not adopt is of significance in this study. The random component is Y with a binomial probability distribution, whereas the systematic component is the continuous predictor represented by X, hence the logit transformation y=lnx/1-x = logit(x).

The objective of the study was to assess adoption of green supply chain strategy categorically. Those firms adopting and those not adopting. To transform the dependent variable to a dichotomous measure, the results of those scoring at very high and high were combined and denoted by one (1) and the reminder which was moderate, low and not at all were combined as another measure denoted by zero (0). The first step given by the classification table output revealed that out of 70 cases 51% fell under the category of those adopting. A logistic regression conducted to find the best combination of drivers for adoption of green supply chain strategy and the results revealed that perceived business benefits was a major driver. The results of regression of perceived business benefits only show Nagelkerke R square results of 0.50 and Cox & Snell at0.375 an indication that more that 50 percent of the prediction was explained by the present study results.

The logistic regression output for the dependent variable given by variables not in the equation output yield a score of 26.2 with 1 degree of freedom and a significance level of 0.00.Hosmer and Lemeshow test result of above 0.05 were obtained hence a reliablemeasure of model fitness. The model fit was found to be good.The effect of the independent variable perceived business benefits as a driver of green supply chain strategyis given by the outcome of the logistic regression as indicated on Table 3 below.

	B	S.E.	Wald	df	Sig.	Exp(B)
X	2.319	.558	17.241	1	.000	10.162
Constant	-7.845	1.908	16.912	1	.000	.000
a. Variable(s) entered on step 1: X.

Table 3: Logistic Regression output for Perceived Business Benefits

The likelihood function was used for estimating the probability of the data collected on the assumption that the probability of the observed values of the dependent variable would be predicted from the observed values of the independent variable. The model took the form presented below:

$\ln(Y) = \alpha_0 + \alpha_1 X_1 + e$. Where,

Y = the odds ratio - adoption of green supply chain strategy.

1 to denote those adopting the strategy, and 0 to denote otherwise

$\ln(Y)$ denotes = natural logarithm of the ratio of the odds ratio

X_1 denotes = Perceived Business Benefits

α_1 denotes = the coefficient, α constant and e, the error term.

e-is the error term assumed to be independent to follow some distribution.

Substituting for values obtained from the computation we get the following equation:

$\ln Y_1 = -7.8 + 2.3X + 0.5$.

The odds ratios for (X) Perceived Business Benefits is 10 which means that one point increase in the scale for measuring respondents' influence of Perceived Business Benefits to adopt green supply chain strategy increases odds of adoption by a multiplicative factor of 10. The beta coefficient is 2.3 and the results reveal that the variable hashigh probability and it is statistically significant at 0.00, where significance test value is $p < 0.05$.

The null hypothesis for this study was stated as follows:

H_0 = Perceived Business benefits do not influence adoption of green supply chain strategy by manufacturing firms in Kenya.

Perceived business benefits has a calculated p-value of 0.00 and Exp(β) of 10. According to these survey results, there is substantial evidence to reject the null hypothesis and conclude that perceived business benefits influence adoption of green supply chain strategy by manufacturing firms in Kenya.

4.2. Discussions

The descriptive statistics show that perceived business benefit variable influence strategic decisions related to green issues facing an organization and its environment in general. Operational efficiency and cost effectiveness, competitive advantage and customer-supplier relations were the main factors contributing to strategy adoption at about 67 percent. There was strong evidence of improved economic performance associated with adoption of green supply chain strategy as revealed by the results where 50 respondents signaled growth in profits in the range of 6%to 15%. These results can be used to dispel the fear that adopting green supply chain strategy does not have any economic benefits and that the benefits do not drive adoption of the strategy.

The test of hypothesis for this variable was significant and the null hypothesis which stated that:H_0 = Perceived business benefits do not influence adoption of green supply chain strategy by manufacturing firms in Kenya was rejected. The logistic regression analysis results reviewed that for every unit change of a factor of perceived business benefits there was likelihood to adopt of 10 times against not adopting. This variable contributed to the model fit where the significance level for variables was p-value equal to 0.00. The Hosmer and Leme show results likewise were non-significant at p-value of 0.244 a situation when a logistic regression is construed to have good fit.

Hajikhani *et al*. (2012) posit that it is well-known that making revenue and financial profits are the most significant objectives of any organizations. Our study has reviewed evidence of economic benefits linked to adoption of GSCS and by extension significance of the variable as a driver of the process. The GSC strategies in Kenya are of two fold, that is, cost-efficiency and innovation-led with the former being more popular. Respondents agreed at very high and high combined at 68.6% to this factor in respect of its influence on adoption coupled with GSCS practices such as reducing energy consumption and use of design for environment in product design. Craggs (2012) envisage that the top green supply chain features include an emphasis on life-cycle costing, asset efficiency, waste reduction, service reduction, service innovation, and recycling. The researcher retaliates that companies tend to limit their environmental innovation to their flagship products to benefiting from that status, while the actual need is that of the entire product range.

Chien and Sikh (2007) identified both external and internal factors/drivers that contributed to adoption of GSC strategies. They include; environmental regulation, external stakeholders, environmental performance (internal) and financial performance (internal). These findings are consistent with the results of our study, the value chain theory and our proposition in respect of perceived business benefits. Internal strategic motivations were the most significant predictors of adoption of Green Supply Chain Management practices as posited by (Hajikhani, Wahiza and Idris, 2012).

5. Conclusions and Recommendations

The purpose of the study was to assess the extent to which internal and external pressures driven by demand for eco-solutions influenced manufacturing firms to implement green supply chain practices/strategy. Green issues had high influence on adoption of GSCS in Kenya where both internal and external drivers were noted to have significant influence. The null hypotheses was rejected following significant logistic regression results which proved our proposition that adoption of green supply chain strategy has a relationship with green issues affecting an organization. The study showed that green issues are top of the global agenda and both the government and the firms are beginning to respond both proactively and reactively more so where benefits are anticipated.

The results confirm the notion that fundamentals that influence firms to adopt GSCS differs from country to country and more so with level of development. Developed countries were way ahead in implementing strategies relating more to external drivers whereas developing countries concentrated more with responding to internal drivers. Supply chain management studies were not many for developing countries and low developed countries nor are empirical studies many in the area where the green component is added as envisaged by (Sachan *et al.*,2005). This study has found that adoption of GSCS is not just a buzzword but an emerging research area that calls for in-depth research to help the country focus more strategically to the global environmental agenda.

5.1. Recommendations

The findings of this study and the implications of the green issues on adoption of green supply chain strategy by manufacturing firms in Kenya lead to a number of recommendations. The manufacturing firms studied fell into five different sectors and in terms of ownership, some were multinationals, others public and yet others private. A study with a moderating variable for type or ownership of firm is recommended. Perceived business benefits were found to be significant drivers of an eco- friendly system in Kenya. Research to find how governments can leverage on perceived business benefits to improve environmental sustainability is recommended. Managerial recommendations include the need to benchmark and to set environmental internal standards to address the issues of innovation, carbon trading and training of suppliers on green issues.

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