

**DRIVERS OF ADOPTION OF GREEN SUPPLY CHAIN
STRATEGY BY MANUFACTURING FIRMS IN KENYA**

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**Drivers of adoption of green supply chain strategy by
manufacturing firms in Kenya**

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and Technology**

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DECLARATION

This thesis is my original work and has not been presented for a degree in any other university

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DEDICATION

To Mwirigi, Munene, Mutwiri, Makena, Nkirote and Kinya.

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DEFINITION OF TERMS

- Drivers:** The pressures/motivators that induce firms to adopt GSC activities (Zailaini & Wooi, 2010).
- Green :** A practice to portray the environmentally friendly image of products, processes, systems and technologies, and the way business is conducted (Zailaini & Wooi, 2010)
- Green manufacturing:** The manufacturing processes, resources, product configuration and design, and material and product handling that preserve energy and natural resources, reduce pollution and protect man and nature (Halevi, 2001).
- Green Purchasing:** The environmental management of purchasing and supply chain, that takes into consideration, the issue of sustainability in purchasing of inputs in addition to the traditional purchasing criteria (Zailaini & Wooi, 2010)
- Green supply chains:** The process by which suppliers and buyers reduce the environmental impacts throughout the value chain including product design, material selection, and manufacturing process, transportation and recycle and disposal of used goods (Jun, Cheung, JingJing, & Qingyuan, 2010)
- Green supply chain management:** Supply chain management with the ‘green’ component and involves addressing the relationships of the supply chain to the natural environment (Sarkis, 2005).
- Green supply chain strategy:** The science and art of employing supply chain capabilities by a firm to reduce negative environmental impact for both the external and internal environment to

attain the objective of improved environmental and firms' performance (Plambeck, 2006).

Ontological thinking: The aspect of putting knowledge creation activities in its proper perspective (in case of 'green' in supply chain management (Oral, 2009).

Strategy: A system of finding, formulating and developing a doctrine that will ensure long-term success if followed faithfully.

Reverse logistics: The returning the end of life product or packaging from end user back to the supplier (Lembke, 2002)

ACRONYMS/ABBREVIATIONS

CDKN	-	Climate Change and Development Knowledge
CFCs	-	Chlorofluorocarbons
COMESA-		Common Markets for Eastern & Southern Africa
CSR	-	Corporate Social Responsibility
DANIDA	-	Danish International Development Agency
DFE	-	Design for the Environment
EAC	-	East Africa Community
EIA	-	Environmental Impact Assessment
EMCA	-	Environmental Management and Coordination Act
GHG	-	Green House Gases
GOK	-	Government of Kenya
GSCS	-	Green Supply Chain Strategy
GSCM	-	Green Supply Chain Management
HSE	-	Healthy Safety and Environment
JICA	-	Japan International Cooperation Agency
KAM	-	Kenya Association of Manufacturers
NEMA	-	National Environmental Management Authority
NGO	-	Non-Governmental Organization

OECD	-	Organization for Economic Co-operation and Development
OSHA	-	Occupational Health and Safety Act
PPP	-	Public Private Partnerships
PWC	-	Price Waterhouse Coopers
SCM	-	Supply Chain Management
SOE	-	State of the Environment
UNEP	-	United Nations Environmental Programme
UK	-	United Kingdom
WHO	-	World Health Organization

ABSTRACT

This study addressed the issue of drivers of adoption of green supply chain strategy that contribute to the choice of strategies firms have to respond to green issues. The proposition was based on the concept of environmental theme of Procurement and Supply Chain Management strategic capability. The target population was manufacturing firms in Kenya registered with the umbrella body the Kenya Association of Manufacturers as at 2013. A survey research design where 80 respondents from a sample frame of 441 was adopted. Multi-stage sampling technique was used to identify a reasonable number of sectors from which consequent elements were drawn. The first entailed randomly selecting five strata from the 12 sectors. This was followed by systematic sampling of elements proportionally from each stratum. Questionnaire designed based on themes from the research framework were piloted to 10 firms and checked for construct validity and reliability through test of internal consistency using Cronbach's Alpha tool which yield results of above 0.8 for all variables tested. Survey method of data collection was adopted and 80 questionnaire instruments were distributed. The empirical data obtained from the 70 manufacturing firms who responded was analyzed using descriptive and logistic regression model to test the hypotheses. All the assumptions for use of logistic regression were observed. The results of the hypotheses revealed that out of the five drivers three including regulatory pressure, customer pressure and corporate social responsibility were non-significant but the results elicited valuable information for future research. The study concluded that internal stakeholders and perceived business benefits are strong drivers of adoption of green supply chain strategy by manufacturing firms in Kenya. Top management and cost effectiveness were the most influential. Lack of awareness was a dominant aspect in this study. The implication of this study is that manufacturing contributes to economic growth as envisioned by the government in Kenya Vision 2030, and due to its place along the supply chain, both the government and manufacturing firms ought to drive the implementation of responsive and proactive approach towards emerging green

issues. Areas for further study recommended include research to explore the role of capacity building for a green economy.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

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. Green supply chain concepts manage environmental impacts where they occur, and ideally before they occur (Basu & Wright, 2008). Christopher (2011) argues that despite numerous influential reports on the issue of greenhouse gases being brought to the attention of governments, industry and the wider public on a global scale, it has proved difficult to get universal agreement. The author envisages that for supply chain managers the issue is a particular call to action since some major causes of green house gases arise from industrial activities such as manufacturing, energy production and transportation.

Seman, Zakuan, Jusoh, and Arif (2012) envisage that economic growth increases the level of energy and material consumption, which contribute to the environmental issues and resource depletion problems. Jensen, Munksgaard, and Arbjom (2013) postulate that increasing pressure on natural resources and a resulting pressure to utilize more green energy implies that companies are bound to experience increasing pressure from stakeholders to reduce environmental impact. These include not only from focal companies but also from entire supply chains, including customers/purchasers, governments and regulators, non-governmental organizations (NGO), communities, shareholders, and even internally from company employees.

Oral (2009) stipulates that 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. Basu *et al.* (2008) envisage that organizations are facing increasing challenges to balance business performance with

environmental issues and the challenges have created a new area of green supply chain management. According to Anderson and Madhava (2002) different economic regions use different approaches of responding to environmental pressures. Non-governmental organizations in Latin America, Africa, and Japan used a collaborative approach with their governments, whereas in Europe and North America they pressured the governments to take action against the ozone layer depletion.

Literature citing green issues varies from highly developed countries to least developed and in terms of supply chain management (SCM) publications only a few were available for developing and under developed countries (Sachan & Datta, 2005). Ruteri and Xu (2009) found that in Tanzania the concept of SCM was barely understood nor leveraged by those in the food industry sector. Seman *et al.* (2012) explored green supply chain management studies for developed and developing countries in relation to manufacturing and found that in terms of implementation and adoption, there were very few studies (Arimura *et al.*, 2011; Zhu *et al.*, 2011; Cagno *et al.*, 2011; Diabat & Govindan, 2011; Al Khidir & Zailani, 2011). Large, Chiou, and Cetinkaya (2011) found that most researches cited are those from Europe and United States with China following closely and Africa occupies the lowest position. Ojo, Akinlabi and Mbohwa (2014) found that in South Africa there was literature on supply chain management relating to the construction industry but hardly any in green supply chain management. Nigeria construction industry lacked studies in both areas. Ruteri *et al.* (2009) posit that the food industry sector in Tanzania, failed to tap the advantages of SCM concept due to lack of understanding of the concept. The few green supply chain studies in Kenya are either case studies or sub-sector specific with non addressing the implication of drivers strategy adoption. This study dwells on the significance of adoption by manufacturing firms of a strategy that encompasses 'green' right from sourcing decisions through to disposal.

SCM is multi-disciplinary and its evolving strategies that are responding to environmental challenges as has been cited in literature covering most developed and

developing countries (Zhu, 2004). SCM deals with total business process excellence and adding “green” component involves addressing the influence and relationships of SCM to the natural environment (Sarkis, 2005). Green has become a common practice to portray the environmentally friendly image of products, processes, systems and technologies, and the way business is conducted (Zailani, 2010). Bolo (2011) argues that for large companies to achieve efficiency and flexibility in their manufacturing methods and in order to handle uncertainty in the business environment, they need different strategies to manage the flow of goods from the point of production to the end user.

Traditionally business and society saw nature as a provider of free goods such as water, air, minerals and waste disposal facilities. 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 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 (Campbell & Craig, 2005). Singh, Sharma, Barcellos and Borella (2015) envisage that SCM has over the years leveraged itself as a tool for offering competitive advantage over other organizations in the industry. In addition, green supply chain management has in recent times gathered acknowledgement and implementation in diverse business sectors such as electrical, electronic, automobile, and power generation industries among others.

The World Resource Institute and Global Consultancy AT Kearny estimated worldwide prices of oil and natural gas to increase from 22 to 50 percent by 2018 from the baseline of 2008, anticipated to be because of more stringent climate change regulations and growing water scarcity in key agricultural regions. For example, Walmart the world's leading retailer announced in 2008 that it was not going to purchase from the Chinese suppliers with poor environmental performance records hence the condition requiring its suppliers to provide certification of their compliance with China's environmental

protection (Jun, Cheung, JingJing, & Quiguan, 2010). The global survey conducted by Boston Consulting group in 2009 revealed that 73 percent of consumers surveyed consider it important for companies to have good environmental records and majority paid a premium for green products. The 2008 amendment of Lacey Act in United States prohibits all plant made products for example, furniture and paper, illegally sourced from old-grown tropical rain forest in US or from foreign countries (Jun *et al.*, 2010).

The Economic Survey of 2012 reports that management of the environment and natural resources continue to pose major challenges forcing governments to continuously pursue major policies and development programmes. For example, in 2011 Kenyan government with support from the Climate Change and Development Knowledge (CDKN), the Common Market for Eastern & Southern Africa (COMESA) and other development partners commenced the process of developing a comprehensive climate change action plan (GOK, 2012). The United Nations climate change conference held in South Africa in 2011 agreed on a new legally binding treaty limiting greenhouse gas emissions to all 194 member state countries Kenya included (GOK, 2012). According to National Environmental Management (NEMA) report of 2008, Kenya entered into a memorandum of understanding between the United Republic of Tanzania and the Republic of Uganda for co-operation on environmental management and the treaty for establishment of the East African Community (EAC) and under waste and climate convention on control of trans-boundary movements of hazardous waste disposal (GOK, 2008). Lederman and Maloney (2007) argue that shares of manufactures in total merchandise export of natural resources may lead to a reduction of resource dependence if appropriate policy responses are adopted. However, in these statistics of the percentage shares of export it was noted that Japan topped at 98.1 percent, Uganda 1.2 percent, Tanzania 11.8 percent but Kenya did not feature.

As the limits on the physical environment's ability to provide services become clearer, a renegotiation has to take place and this manifests itself in form of control and limited access to environmental goods. Tutore (2010) envisage that the green revolution is likely

to affect every business activity in future, noting that some sectors are more likely to be more liable for change than others. The primary sector (extractive) and secondary sector (manufacturing) are viewed as the worst enemies of the environment. The author retaliates that the two sectors are not separate from service sectors as they are important consumers of service products. Cousins, Lamming, Lawson, and Squire (2008) posit that 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 include 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. Tutore (2010) envisage that each driver stresses in different ways the adoption of environmental concern, external drivers, which include legislation, customer pressure and social responsibility impose ecological responsiveness, whilst internal factors such as employee demands and management encourage its voluntary adoption.

The history of environmental management indicate that the subject was basically left to environmental professionals and for those seeking employment leaving very little room for a host of stakeholders all seeking to reach the same goal of reconciling the demands of modern technological society with the available resources of the planet (Whitelaw, 2004). According to OCED's 2011, "Government At A Glance" report where 34 countries were analyzed, it was noted that, less than a half had established a standard definition for green procurement and only six - including Denmark, France, Italy, Japan, Luxembourg and Slovenia had incorporated the definition into law. The Public Procurement and Disposal Act, 2005 and Constitution of Kenya 2010 have exemplified the need to promote environmental protection through public procurement. Empirical evidence however 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.

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 (Cetinkaya, 2011). Research reveals that 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). Literature posit that keen firms do not fail to spot the opportunities associated with meeting the demand side and constraints which when combined make the environment a strategic issue *par excellence* (Hines, 2004). Additionally, some firms may be able to cross these hurdles through various efforts and approaches, while others may find themselves less equipped to cope with the concern.

In Kenya, the quest for understanding of environmental management aspects began when the environmental regulating EMCA Act (1999) came into operation with the establishment of the National Environmental Management Act (NEMA) as a 'watch dog'. The consequences of doing business in disregard of the law are dire notwithstanding the high cost of complying. For example, the Controlled Substances Regulations 2007 Legal Notice No.73 of 2007 and Legal Notice No. 121 (GOK, 2008). Government policies may also push cost of raw materials up to discourage producers from using undesired products in their manufacturing processes as has been witnessed in Kenya - the case of plastic paper bags and Rwanda that placed a total ban on use of plastic paper bags.

Policy makers in Kenya recognize the importance of the manufacturing sector for long-term economic development. According to Economic Survey of 2012, the government of Kenya through the National Cleaner Production Centre - worked with 400 Kenyan enterprises from industry sector in an attempt to reduce energy consumption. According to the Economic Review 2014, manufacturing contributes 10 percent of the Gross

Domestic Product (GDP) (GOK, 2014). Manufacturing grew at 4.4 percent in 2010, which was more than double the 2.0 percent growth rate recorded in 2009 attributed to good weather, which assured manufacturers of steady supply of primary raw materials and hydroelectric power. The manufacturing sector has 12 sectors and the five identified for this study include: Building, Mining and Construction, Energy, Electrical and Electronics, Food and Beverages, Pharmaceutical and Plastics and Rubber. The growth in manufacturing in 2012 to 2013 was attributed to manufacture of cement, food and beverages. The Food and Beverage sector, Plastic and Rubber, Energy, Electrical and Electronics had some of their sub-sectors affected by high cost of fuel and raw material supply. In general, the firms suffered from cheap imports, erratic weather conditions and high cost of production. The number of registered manufacturing firms grew from 594 in 2001 to 698 in 2009, while electricity consumption doubled in the same period and population grew by 10 million to 38,610,097 million by the time of the last census in 2009 (GOK, 2010). JICA (1998) reviewed that industrial wastes constituted about 23 per cent of the total solid wastes generated in Nairobi. Forest cover in Kenya had not increased over the same period but remained at an average of 1.9 million hectares. This growth is not without challenges as evidenced by ineffective control of industrial water pollution, a case of Pan Paper Mills, Kenya Meat Commission, Thika based tanneries and textile, which consume a lot of water and release wastewater into open water bodies.

The 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. The government retaliates 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. In addition to resource use, linkage with global suppliers exposes the manufacturing firms to environmental problems of other nations, which include creating space for dumping, acquiring obsolete technology, logistical problems and legal issues (GOK, 2008). Kenya's situation like the industrialized states demands environmental attention (GOK, 2010).

1.2 Statement of the Problem

Greening supply chain has become a necessity as environmental concerns have remained at the forefront of the debate of global and local social interests. Vacho (2006) envisage that it is common believe that green supply chain practice represents the environmental-friendly image of products, process, systems and technologies, and how the business is conducted. Manufacturing processes affect the resource footprint primarily through their use of energy, their relative efficiency and the creation and disposal of waste and toxic materials/effluents. Conversely, with changing trends of outsourcing and offshore manufacturing, it may not always be apparent to the customer what impact manufacturing strategy decisions can have on supply chain sustainability in manufacturing (Christopher, 2011). The growing importance of supply chain management, its ability to integrate with functional departments internally and with external members of the network creates a great opportunity for researchers, academician, businesses and the governments to develop appropriate strategies. This can enable them to match appropriate green supply chain strategy to the inherent business risks and opportunities related to environmental challenges leveled against manufacturing as has been established by this study.

Basu *et al.* (2008) envisaged that the sheer number of regulations and other influences relating to the dynamics of the environment in which business operate, makes it difficult for firms to decide exactly how they should respond to pressure. 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). Regulatory pressure affecting businesses vary from country to country, both in meaning and measurement (Dutch Ministry of Justice, 2006). Government of Kenya (2010) report indicates that without stringent regulatory and enforcement mechanisms, manufacturing firms would not be paying attention to issues of environmental degradation. Muma, Nyaoga, Matwere and Nyabega (2014) posit that due to heightened environmental concern, the

government and general public have increased pressure on firms to consider their corporate activities in relation to the natural environment. Simpson (2008) urges proponents of green supply chain management (GSCM) to broaden the scope of our understanding of potential strategies rather than just concentrating on a series of related greening practices without a definite purpose. Most researchers and authors who have contributed immensely in this field were from other disciplines, hence the need for more research with a bias in SCM. Research in green supply chain has tended to be through case studies and review of literature over a given period. This limitation gave room for empirical studies to aid in build-up of models and theories for the drivers of the green supply chain strategy, which eminently bears the solution to environmental problems affecting manufacturing in Kenya.

Although research in developing and developed countries show strong evidence of businesses overcoming green issues through adoption of appropriate green supply chain strategies, there were no such studies for these drivers in relation to the five manufacturing sectors covered in this study. This study therefore sought to analyze how firms' had leveraged on supply chain capabilities to respond to green issues, and to determine the rationale of firms' desire to adopt green supply chain strategy.

1.3 Objectives of the Study

1.3.1 General Objective

The overall objective of this study was to determine how the five drivers (regulatory pressure, customer pressure, perceived business benefits, CSR and internal stakeholders) contributed to adoption of green supply chain strategy by manufacturing firms in Kenya.

1.3.2 Specific objectives

- 1) To establish the influence of regulatory pressure on adoption of green supply chain strategy by manufacturing firms in Kenya
- 2) To examine the influence of customer pressure on adoption of green supply chain strategy by manufacturing firms in Kenya.
- 3) To determine the influence of perceived business benefits on adoption of green supply chain strategy by manufacturing firms in Kenya.
- 4) To assess the role of corporate social responsibility on adoption of green supply chain strategy in manufacturing firms in Kenya.
- 5) To examine the contribution of internal stakeholders on adoption of green supply chain strategy by manufacturing firms in Kenya.

1.4 Hypotheses

In light of existing literature, secondary data and observation of the state of green challenges and opportunities in Kenya, five null hypotheses were proposed for this study. They included the independent variables (drivers) construed to have no effect on firms' responsiveness towards adopting green supply chain strategy.

The researcher postulated and tested the following hypotheses:

Ho₁: Regulatory pressure does not contribute significantly to adoption of green supply chain strategy by manufacturing firms in Kenya.

Ho₂: Customer pressure does not contribute significantly to adoption of green supply chain strategy by manufacturing firms in Kenya

Ho₃: Perceived business benefits do not influence adoption of green supply chain strategy by manufacturing firms in Kenya

Ho₄: Corporate Social responsibility does not influence adoption of green supply chain strategy by manufacturing firms in Kenya

Ho₅: Internal stakeholders do not contribute significantly to adoption of green supply chain strategy by manufacturing firms in Kenya

1.5 Significance of the Study

This study of manufacturing firms in relation to environmental impact and their place in supply chains was found relevant as it provided insights of significant importance to a myriad of stakeholders seeking eco-value.

1.5.1 Manufacturing Sector

Manufacturers need appropriate information on the best supply chain mix to respond to the ever-changing business and natural environment. This study revealed that green manufacturing and reverse logistics were popular green strategic options which firms leveraged. The study revealed a lack of awareness by most of the stakeholders and as envisaged they will now be in a better position to learn from a myriad solution offered by the market in this era of green hype. According to KAM, various manufacturers face environmental related challenges, which constitute one of the areas this umbrella body serves to support. KAM acts as a representative to government regulation, policy advocacy and research. This study has added more scholarly research information to benefit KAM and her stakeholders since most of the studies targeting manufacturing firms in Kenya are either case studies or specific firms and not necessarily sectors.

1.5.2 The Policy Makers

Literature asserts that regulation is one of the drivers of green supply chain strategies. Governments can thus leverage on the information generated through research to formulate the right policies and regulations to respond to green issues and to improve the economic and social welfare of its citizen. The government will be motivated to direct

more resources in support of research and development of studies in this area. The need to create awareness emerged as a critical area requiring government intervention.

1.5.3 Financiers/Insurers and International community

Environmental disasters and other business related risks call for lenders to understand whom they are lending to, and what project to finance. This study was found to be of importance in decision making by this group of stakeholders. The fiscal policy for green initiatives was lacking. The international community represents the bulk of suppliers of raw materials and parts required by manufacturers in Kenya and also the end markets for Kenyan produce. Literature asserts that global environmental regulation has implication on business strategy adopted by firms. Kenya is renowned for its produce of agricultural products which form the bulk of her export. The importers demand compliance to set internal standards throughout the supply chain and more so the origin.

1.5.4 Academic and Research Institutions

Studies on green supply chain are relatively new with very few being of empirical nature. Most of the secondary data relating to green issues in Kenya is not tied to supply chain management and this study sheds light and supplement other studies in the area as GSCM strategies become more complex. Additionally, studies using logistic regression model in this area are not common and the outcome is indeed a pointer to the importance of exploring new approaches to reveal some aspects that may be hidden when other methods are used.

1.5.5 Community

The community expects a lot from businesses and as such they are target for CSR programmes by manufacturing firms. The community does not operate in isolation and firms' strategic decision must consider the place of the community as a factor in formulation and adoption of green supply chain strategies. The community is impacted

by activities of manufacturing firms and on one hand they are seen as key drivers of adoption of green supply chain strategies by manufacturing firms in Kenya. This study found that the pressure from the community was not significant, but how their role can contribute towards the development of green manufacturing firms was exemplified.

1.6 The Scope of the study

This study targeted manufacturing firms in Kenya registered with Kenya Association of Manufacturers as at 2013. These firms are concentrated in major urban areas within Nairobi Metropolitan carrying more than 80% of the large ones. There are 698 members spanning fourteen main categories. Two of the categories are the in service sector which was outside the scope of this study. The remaining twelve exhibit different manufacturing features and through this study which evaluated the contribution of the drivers in relation to adoption of GSCS inferential information can be shared. On five sectors were studied including Building, mining and construction, Energy, Electrical and Electronics, Food and Beverage, Pharmaceutical, and Plastic and Rubber. The study revealed that two key drivers studied were found to contribute significantly to adoption of the strategy. They include internal stakeholders and perceived business benefits.

1.7 Limitations of the Study

First, the scope and extent of the study was restricted to manufacturing firms which were heterogeneous and the sample size for the smaller sectors was relatively low. As such, it may not be wholly representative of all firms scenarios in relation to green issues encountered. Secondly, respondent availability and responsiveness posed some challenges to the researcher in regard to distribution of the questionnaire and time taken to receive feedback. The challenge was overcome by follow-up and replacement of misplaced the data collection instruments through email or hard copies as envisaged in the methodology. Thirdly, the measure of adoption of green supply chain strategy was categorical and less weight was given to the attitude measures in arriving at the index

measure of those adopting. This may limit global application of the study, though the findings elicit new approaches for future studies.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter provides review of literature related to the problem of drivers of adoption of green supply chain strategy by manufacturing firms in Kenya. 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.

2.2 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 (ElTayeb, Zailani, & Jayaraman, 2010). The GSC encompasses a broad range of practices from green purchasing to integrated supply chains flowing from suppliers, to manufacturers, to customers, and to the reverse supply chain, which is “closing the loop” (Zhu & Sarkis, 2006). The supply chain process encompasses various bodies of knowledge and so are the theories.

2.2.1 The “Value Chain” Theory

Studies review that a well executed supply chain strategy result in value creation for the organization (Bolo, 2011). Yuanqiao and Mullai (2008) refers to “Value chain” as “supply chain” from a focal company’s perspective. According to Lepak, Smith and Taylor (2007) “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 (Basu, 2008; Svensson, 2009). Bolo (2011) noted that one major stream of research dominates the SCM strategy literature with emphasis on the effect of competences, capabilities, strategy formulation and implementation on firms performance. Bolo, (2011) based the study on the Porter's value chain model of 1985. The conclusion was 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 (Basu, 2008, & Zailani, 2010). 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). Seman *et al.* (2012) envisage that integrating the 'green concept to supply chain concept' creates a research agenda where supply chain has a direct relationship to the environment.

In designing closed-loop supply chain systems, it is important that managers take value creation into consideration, not merely cost avoidance (Jensen *et al.*, 2013). To develop greener supply chains, a life-cycle approach is inevitable in order to achieve reliable, robust results and prevent false optimization and wrong choices which lead to burden shifting within or between economic and environmental performance. This approach not only emphasizes production of green products along with management and control of the entire supply chain but also requires changing the view of the supply chain as a linear process, taking products from cradle-to-grave, to adoption of complex concepts such as the cradle-to-cradle philosophy comprising a closed-loop material flow.

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.

2.2.2 Institutional Theory

Delmas and Toffel (2003) envisage that institutional theory is concerned with the influence of external forces on organizational decision-making and it emphasizes the role of social and cultural pressures imposed on organizations that influence practices and structures. According to Kraft and Scott (2007) Institutional Theory is "Policy-making that emphasizes the formal and legal aspects of government structures". Krell, Matook and Rodhe (2009) envisage that regulatory pressure occurs when governmental agencies directly or indirectly force firms to change their strategy. Glover, Champion and Daniels (2014) posit that the strength of Institutional Theory is that it offers explanations of why certain practices are chosen without an obvious economic return. Further, the institutional perspective allows for the focus on the role of conformity, regulatory and social pressures in driving organizational actions. Tate, Dooley and Ellram (2011) posit that 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.

Zailani *et al.* (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 GSCM practice adoptions influenced operations and manufacturing management. The institutional pressures they studied includes: 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.

Azevedo, Carvalho and Cruz-Machado (2011) state that the impact of the antecedents and drivers for a green supply chain may be diverse across different supply chains with different manufacturing processes, with different raw materials, conversion processes, product characteristics and logistics/reverse logistics activities. Simpson *et al.* (2008) postulate that four types of GSC strategies theoretically match the challenge. They include risk-based strategies, efficiency-based strategies, innovation-based strategies and closed loop-loop strategies. Al Khidir (2010) reviewed 30 empirical studies based on drivers of environmental/green initiatives/strategies with the result that regulatory driver constituted 87%, followed by customer pressure at 43% , expected business benefits at 40%, social responsibility 30%, community pressures 17%, competition 10%, employee pressures 7% and supplier pressures and market demand at 3%.

2.2.3 System Theory

Mele, Pels and Polese (2010) envisage that a systems theory is a theoretical perspective that analyzes a phenomenon seen as a whole and not as simply the sum of elementary parts. The focus is on the interactions and on the relationships between parts in order to understand an entity's organization, functioning and outcomes. Systems can be found in nature, in science, in society, in an economic context, and within information systems. 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. The ultimate success of a supply chain depends upon various factors among which are customer's expectations, globalization,

information technology, government regulations, competition, and the environment (Singh *et al.*, 2015).

Singh *et al.* (2015) applied the concept of system dynamics and how and why it has been applied to Green Supply Chain Management to various facets of GSCM such as inventory management, international green supply chain management demand amplification, green supply chain design, and, finally, information visibility in green supply chain management. The authors proceed to argue that supply chain re-engineering decisions are made under a probabilistic view of the future and that as a result there is a necessity for decision support tools that can help managers to understand costs, benefits, and risks associated with various alternatives. According to Zhu *et al.* (2006) environmental regulations may include domestic environmental regulations, government environmental policies and international agreements. System theory characterizes the effects of external pressure on organizational structure (Chien *et al.*, 2007). Hui *et al.* (2001) envisage that public's increasing environmental consciousness, the statutory requirement due to government policies and regulations, and pressure from organized groups are some of the factors that sway companies towards adopting a green manufacturing or environmental management system policy.

2.2.4 Stakeholder Theory

Argandona (2011) uses stakeholder model to exemplify the theory of value creation as one that encompasses a stakeholder as all those who create or capture value or who in their relationship with the firm (owners, managers, employees) assume risk or outside the firm (consumers and suppliers), or who suffer the impact of the firms externalities or misinformation (local communities, environment, future generations, society at large). 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.

Hervani, Helms and Sarkis (2005) envisage that external stakeholders affecting green supply chain management (GSCM) include customers, suppliers, the community, regulators and non-governmental organizations. Zhu *et al.* (2004) stated that environmental protection activities had a positive effect on a firm's financial performance. Umalomwa *et al.* (2012) noted that stakeholder theory provides a framework for corporate social disclosures where disclosure of social and environmental information was because of the pressure from the stakeholders. They pursued this under the argument that 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.

2.3 Conceptual Framework

The concept of drivers of green supply chain strategy stems from theoretical evidence, empirical evidence and concepts formulated by a large number of authors and researchers across most disciplines. The GSCM model and 'value chain' theory inform the dependent variable. Ecological and 'green' issues is 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. 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. Hervani *et al.* (2005) identified external issues as those emanating from external stakeholders and competitors, with pressure coming from regulatory or market pressures. Zhu *et al.* (2005) identified pressures and drivers for adoption and improving environmental performance as those arising from

regulators, supply chain partners, competitors and the market. Coupled with internal stakeholders, five groups identified as key drivers for the adoption of GSC strategy include regulation, consumer pressure, perceived benefits, corporate social responsibility (CSR) and internal stakeholders.

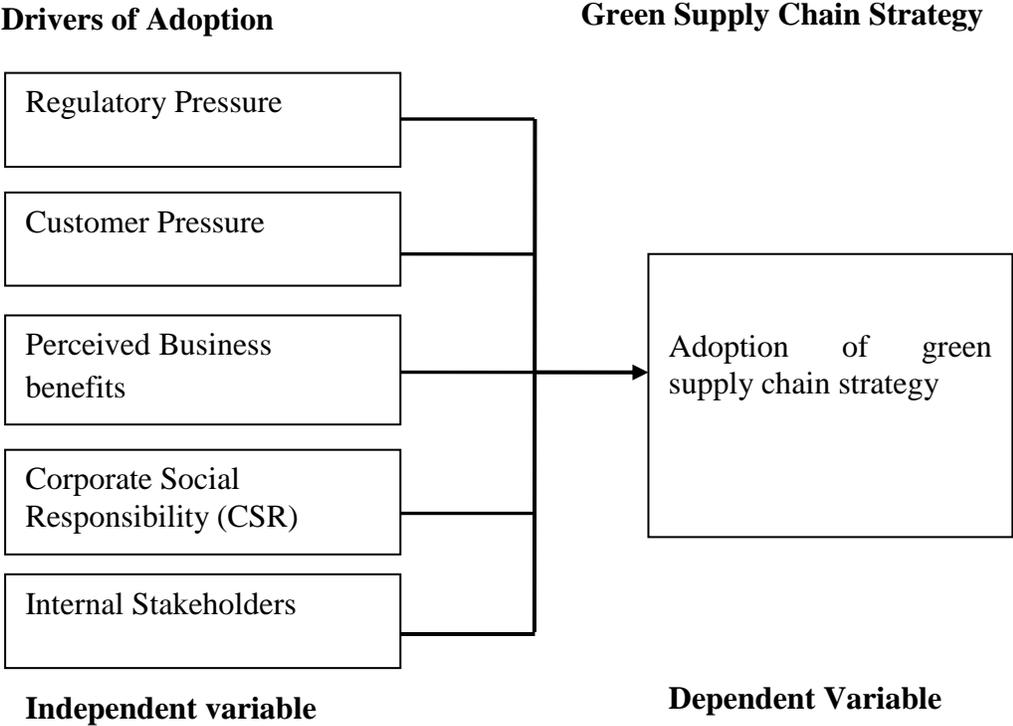


Figure 2. 1: Conceptual Framework

2.4 Empirical Literature Review

2.4.1 Adoption of Green Supply chain Strategy

SCM like other disciplines relies heavily on concepts, definitions, theories, rules and principles of other disciplines. Supply chain strategy is an interactive process that evaluates the cost benefit trade-offs of operational components and understanding a firm's strategic SCM 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 & Datta, 2005). Christopher (2011) supports the argument that the supply chain 'starts on the drawing board' meaning that decisions of design of a product can have a significant impact across the supply chain. The author postulate that in respect to sourcing, green sourcing is emerging as a fundamental aspect of best procurement practice while manufacturing processes are being linked to their impact on resource footprint. Additionally, delivery and reverse logistics are gaining importance since they provide great opportunities for companies to impact their costs and carbon foot prints and that some managers have gone ahead to create marketing strategies that emphasis greenness of their supply chains.

Oral (2009) stipulates that 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. Internal factors relate to a company's strategic attitude, which heavily depend on managers' environmental awareness. External variables on the other hand identify drivers of environmental pressures as those relating to cost control, total quality management, communities, investors and environmental regulations. Handfield, Monczka, Giunipero and Patterson (2009) argue that external forces are constantly changing and are likely to impact purchasing and supply chain management roles required to contribute to a firm's success.

Bolo (2011) argues that the joint effect of core competences, strategy and strategy implementation influence firms performance and that competitive advantage may be gained by the ability of the firm to coordinate its own activities with those of suppliers, channels or customers through strategies used in SCM. The study gives insight that manufacturing firms in Kenya have adopted some form of SCM strategies and that the environment is important in strategy formation. Sarkis (2005) model of GSCM elaborates how supply chain can be adapted to environmental pressures. He argues that each element/component can leverage on its position along the chain to respond with a suitable strategy to green issues. Key components of adoption of GSC strategy are: green purchasing, green manufacturing/materials management, green distribution/marketing and reverse logistics. This is exemplified by Sarkis' model in Figure 2.2.

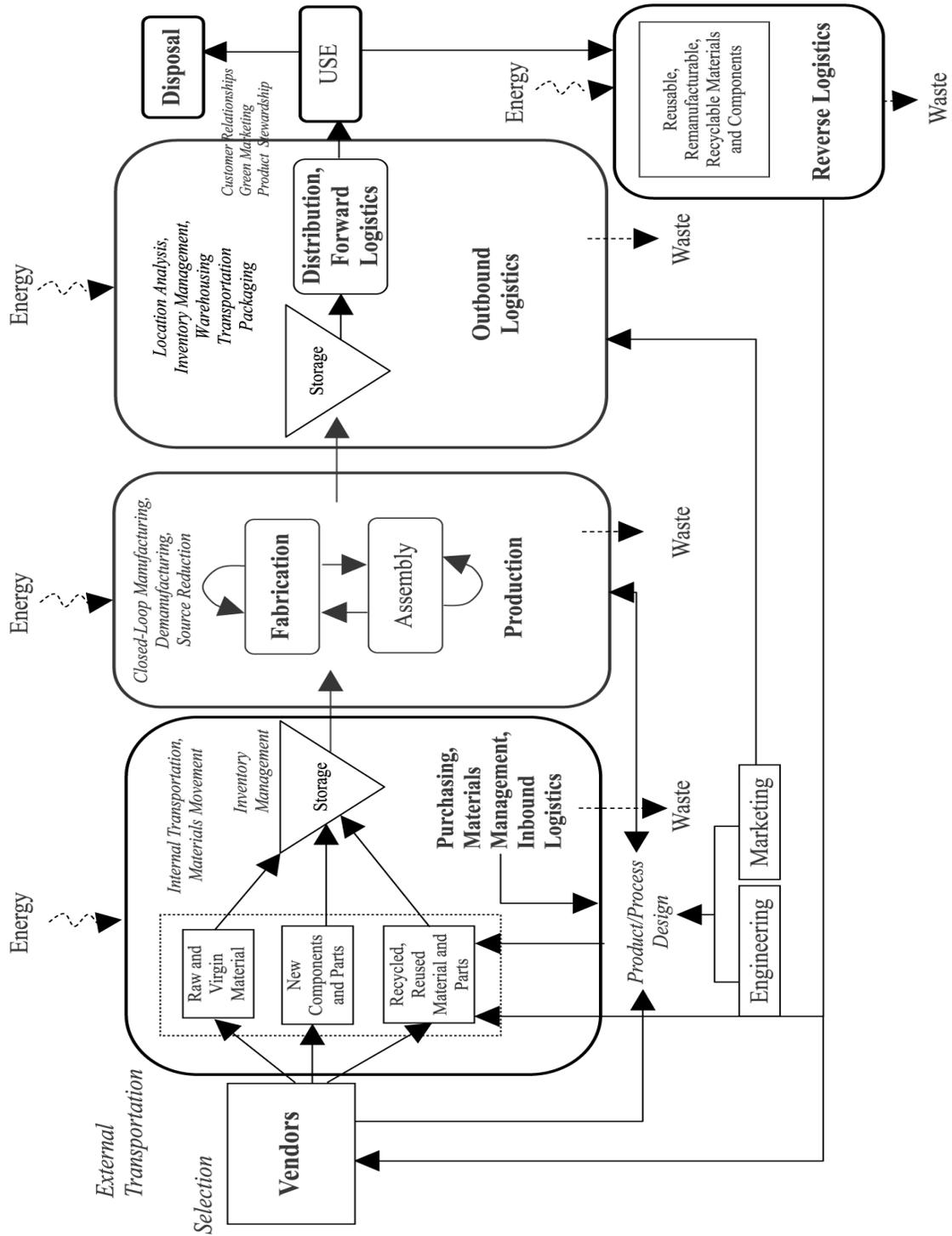


Figure 2. 2: Model graph for GSCM - Source: (Sarkis, 2005)

Simpson and Samson (2008) identified some empirical studies that categorize GSC related strategies into four main categories. They included; (1) use of compliance-based strategies that support the cascading of basic environmental requirements across all suppliers, (2) aligning supply chain goals for both efficiency and pollution-reduction, (3) transfer of environmentally specific innovations or technologically from customers to suppliers, and (4) collaboration or competition between firms to develop re-manufacturing or closed-loop recycling strategies. Marketing strategies for example are very powerful and they direct corporate social responsibility and product designs. For instance, the driver of CSR is the role of independent mediators, particularly the government, in ensuring that firms are prevented from harming the broader social good including people and the environment. Reverse logistics on the other hand deals with product take-back to minimize the challenge of waste and hence closing the loop.

2.4.2 Regulatory Pressure

Regulatory pressure refers to the extent to which regulators threaten to or actually impede a company's operations. Pun (2006) argues that environmental issues are critical concerns of operations management arena. They force manufacturers to comply with regulations and to search for potential legal findings of financial liability for environmental damage. New environmental regulations came up which included Clean Air Act, Clean Water Act, Toxic Substances Act, ISO 14000 series and others where Kenya plays a role - Kyoto Protocol, EMCA 1999, Controlled substances regulation 2007, and Waste Management regulation 2006. This pressure forces firms to develop strategy through which they can demand from suppliers' products that are in line with the regulatory standards. Environmental regulation compliance serves the purpose of improved raw material conservation for sustainable development in Kenya (GOK, 2006). Kenya has adopted several green economy-related approaches and policies, which include implementing renewable energy feed-in tariffs in 2008, embedding sustainable natural resource utilization into its 2010 Constitution and mainstreaming green economy in its Second Medium Term Plan (2013-2017) (UNEP, 2014).

Seksan *et al.* (2010) survey of Thai electronic firms found regulation and export pressure as most important drivers for Thai electronics supply chains to implement GSC strategy. The results of the empirical study carried out by the researcher reviewed three categories of adoption of the green strategy as passive green strategy, reactive and integrative which compares to non-compliance based strategy, compliance based strategy aimed at reacting at external pressures, strategy aimed at commercial and environmental excellence and finally, leading edge strategy. Al Kidir and Zailani (2011) drew the conclusion that drivers (variables) such as regulations, customer requirements, expected business gains and social responsibility led to greening of supply chains through supply chain initiatives towards environmental sustainability.

The assumption that regulation is a driver of GSC strategy practice is likely to be the case with manufacturing firms in Kenya as deduced from literature and empirical evidence. Theoretically, business organizations are expected to comply with environmental regulations set by government bodies in their countries, overseas in relation to exports, and parent companies. For example, Kenya Association of Manufacturers rewards manufacturers for innovations and green activities and work closely with Kenya Bureau of Standards (KEBs) to ensure quality of goods imported and manufactured (GOK, 2012). Manufacturers in Kenya have an even greater challenge because they import most of their raw materials. The mining sector is controlled majorly by multinationals. Hanner (2006) argues that the production of green products does not necessarily mean a firm has embraced a green supply chain initiative, but could be responding to external pressure. For example, companies worldwide stopped using chlorofluorocarbons (CFCs) in production due to bans imposed on those materials by buyers and regulations, but no evidence exists of corresponding worldwide wave of companies becoming green as a result.

Chien *et al.* (2007) posit that international environmental agreement, such as the Kyoto agreement, the climate Change Treaty and the Montreal Protocol influence governments and firms' response to green issues. In Kenya, the Environmental Management Act

(1999) states the responsibility of firms concerning environment issues but some manufacturing firms may just get licensed not because it is part of their strategic policy to be environmentally friendly but to simply comply with the law. However, the current Public Procurement Regulations in Kenya have entrenched green issues in the repealed Public Procurement and Disposal Act, 2005 which now referred to as the Public Procurement and Asset Disposal Act, 2015 (GOK, 2016) .

Zailani *et al.* (2010) noted that despite there being no regulations in Malaysia dictating firms' to use green purchasing strategy, that of other countries had an impact on their firms' to comply. This for the case of Kenya is driven by the regulator (Kenya Bureau of Standards) of quality of goods imported or manufactured in the country. According to EMCA 1999 large manufacturing firms are subjected to environmental impact assessment and annual audits. Fuel handling firms are also subjected to strict environmental regulation that impact on product sourcing, processing, distribution and disposal. Energy constraints and disposal challenges are forcing the government to review policies affecting construction and manufacturing where use of renewable energy for example solar is becoming a mandatory requirement (GOK, 2014). The cost inherent and other operational risks create a desire for firms to consider adopting international standards such as ISO 9001:2008, ISO 14001 and ISO 22000 and eventually a green supply chain strategy.

2.4.3 Customer Pressures

Customers as major financial stakeholders, can exert considerable pressures and demand goals on environmental performance of suppliers ElTayeb, Zailani & Jayaraman (2009). Delmas *et al.* (2003) argue that suppliers are increasingly facing pressure from their customers to improve their environmental performance. Customer scrutiny of environmental effects related to product manufacture makes the environmental factor a key strategic variable with implications for the design of products, the design of processes and operating procedures. Azevedo *et al.* (2011) envisage that increased

pressure from community and environmentally conscious consumers lead to rigorous environmental regulations, such as the Waste Electrical and Electronic Equipment Directive in the European Union, forcing manufacturers to integrate environmental concerns into their management practices. Companies are always looking for ways of differentiating themselves through re-engineering their products and processes, marketing themselves and through exceeding customer expectation (Delmas *et al.*, 2003).

Within the manufacturing sector, firms have been compelled by customers to be ISO 14001 certified to do business with them. Wal-Mart compelled suppliers of cotton to supply them with only organically grown cotton (Plambeck, 2006). There is increased hype in demand for organic products by consumers globally (Jun *et al.*, 2010). Kenya's horticultural sector is always under serious threats because of her international consumers who raise issues of food miles, labour and chemical use in producing and transporting of the goods. Water, energy consumption and disposal of solid waste affect the firm's ability to meet customer needs who also believe that solutions to such challenges lie with the manufacturers (GOK, 2010).

Zailani (2010) in a study on drivers for GSC adoption found that customer pressure was a strong driver as examined through purchasing. Empirical evidence indicates that large firms tend to set strict green standards for their purchased inputs and mandate their suppliers to stick to these standards. Suppliers, in turn, set green specifications for their inputs purchased according to the standards set by customers, and henceforth. This process referred to as "green multiplier effect" is viewed as an important mechanism for diffusing green initiatives among firms (Preuss, 2001). Community stakeholders influence green decisions especially where health impacts and sustainable solutions can be identified with confidence (Kearney, 2004).

2.4.4 Perceived Business Benefits

Arguments do arise as to whether adoption of GSC strategy has benefits or it is simply a buzzword. Research has revealed that many players are not aware of its benefits and even those that are aware are hesitant to change. According to research on some Canadian manufacturing firms targeting distribution, the researchers concluded that the goals of implementing GSC strategies are to gain both environmental and business benefits. Delmas *et al.* (2003) argues that firms adoption of environmental management practices can be view from two theories one relating to economic approach where adoption behaviour is driven by performance outcomes for example when it pays to be 'green'. The second is the one rooted on institutional sociology which emphasis the importance of regulatory, normative and cognitive factors which affects a firm's decision to adopt a specific practice above and beyond the technical efficiency of the practice.

Pressus (2009) envisages 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. Citing the case of Wal-Mart 2006, greening supply chain is a valuable strategy in terms of business profitability and environmental sustainability (Plambeck, 2006). With regard to internal drivers coming from specific organizational features, green management literature recognize the ethical attitude and the economic opportunities coming from the adoption of green proactive strategy (Benito, 2006). 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. According to Vermeulen and Ras (2006) environmental and health benefits are strong drivers of GSC as cited in the Benin case where farmers chose organic cotton farming for the sake of health as opposed to high yields associated with chemical farming.

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). 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. According to Helms (2002) a study of the recycling and disposal of pharmaceutical products in the United Kingdom that focused on reverse logistics and analyzed returned stock from 28 hospitals, found there were significant financial and operational advantages to the National Health Service through developing the reverse logistics processes. The supplier can recycle, refill, remanufacture, refurbish, repair, repackage or reclaim the material. Srivastava *et al.* (2007) argue that profitability and cost reduction are some main motivators for businesses to become ‘green’ in the supply chain.

2.4.5 Corporate Social Responsibility (CSR)

Firms response to environmental issues does not always result from external pressures but may be internal or as some authors term it, “own initiative”. According to Zailani (2010) interest in green initiatives from the internal sense of responsibility of a firm towards the society as a result of environmental problems caused by global warming and pollution may give rise to awareness and interest to respond in a more socially responsible manner. The firms’ behavior is influenced by objectives that stimulate them not to harm the environment but to produce more environmental friendly products and to support those who are best placed to do so in the society. According to Legrand (2010) being a good corporate citizen implies more than just responsible environmental operation; it requires positive engagement in the community in a number of ways, which

include positive contribution to the development of all others they affect, including the community, employees, guests, and suppliers.

CSR depends on context meaning that the same initiative may be appropriate in one country but not the other, or in one sector and not the other or yet in one situation and not the other. Being in sync with constituents and building trust among customers and stakeholders makes it essential to build strategies for strategic business development. Environmental challenges benefit from the specific expertise that companies possess, as technical and managerial skills greatly assist environmental movements leading to win-win outcomes in which environmental impact of companies' is reduced, while lowering operating costs through better equipment and innovation (Frynas, 2009). In Kenya, most tree planting initiatives, building dams, supplying solar gadgets like lamps for use by the less fortunate are common practices. It is not clear whether this ideally fits in a GSC model or corporate social responsibility without the pressure to be environmentally friendly. Zailani (2010) postulated that, sourcing, manufacturing, logistics and marketing activities of most business organizations have negative impact on the environment. Linkages and networks exist between organizations and this means the negative impact of one firm will affect others in varying degrees and hence the need to investigate the extent CSR motivates firms to adopt a GSC strategy.

Green marketing supports green manufacturing since it is customer or demand focused as opposed to product oriented manufacturing strategy. Through green marketing initiatives, firms are able to develop their own positive efforts to be more socially responsible and to meet customer expectations for more environmentally conscious products (Shane, 2003). According to Iles (2006) chemical manufacturers can use green chemistry as a sustainable tool to reduce toxicity, resource and energy use, and pollution of chemicals. Perry and Singh (2002) conducted a survey among 91 MNCs in Malaysia and found that the most important determinants of voluntary environmental actions was pressure to conform to corporate head office on environmental criteria, increased

workforce environmental awareness, consumers especially those located in high-income communities, and community NGOs, and the media.

2.4.6 Internal Stakeholders

Internal stakeholders who are the managers, employees and owners make a firm a better means of managing production than the market. Work is internally linked to the people who perform it, whereas capital is only externally linked to the people who possess it. Firms have multiple purposes many of which are non economic such as; to act with respect towards the environment, to produce goods and services that contribute to improvement of society, to provide employees with an environment in which they can develop both as persons and as professionals and to obey the just laws of a countries in which the operate (Lutz & Mimbi, 2004). Top management when viewed from an internal perspective drives the adoption of green purchasing strategy (Zailani 2010). Sarkis (2006) states that, organizational factors influence a firm's decision to adopt innovative practices and many of them may lead to improvements in environmental outcomes and overall business performance. The internal functions including healthy safety and environment (HSE), operations, engineering, marketing, accounting, human resources and information systems interact to influence strategic choice in relation to green issues. Research and strategic management authors strongly support the notion that the success of strategy formulation and implementation depend on top management support. Zailaini and Wooi (2010) envision that top management is the key driver to drive its firm to take part in green supply chain strategies.

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). Small firms face various difficulties and

barriers to adopt green supply chain initiatives, secondly, the poor environmental performance of small suppliers can affect the performance and image of buying companies (Wooi & Zailani, 2010). The problem is aggravated by the fact that stakeholders often do not distinguish between an organization's environmental practices and the practices of its suppliers. The responsibility to ensure that the industry is strategically fit to reduce environmental impact does not rest with the consumer or the government but the firm itself. Employees who work under harsh environmental conditions affect productivity. Those that are aware of their green rights will demand for the same and if this is absent then consequences of employee turnover will increase. Lin and Ho (2010) postulate that green practices are more likely to be adopted if firms provided organizational support, such as extra resources and training and increasing employee motivation for adoption. Furthermore, when they are subjected to regulatory pressures/or received government support. In Kenya, it is a mandatory requirement for manufacturing firms to insure their employees against such risk as stipulated in Occupational Health and Safety (OSHA) Act, 2008 (GOK, 2007) . From the foregoing, it is quite evident that the issue of green supply chains is a promising area of study and practice that has great potential to provide significant benefits for the firm and the society.

2.5 Measurement of Adoption of green supply chain strategy

Balanced scorecard for SCM captures the notion of organization and coordination of activities from procurement of raw materials to the final customer. The performance metrics evaluated are the financial perspective, customer, internal business and innovation and learning perspectives (Bhagwat & Sharma, 2007). According to Hervani *et al.* (2007) metrics and measures for environmental performance of activities, processes, hardware and services as found in (TRI and Global Reporting Initiative) register, provide a basis for evaluating the extent of adoption of green supply chain strategies. Environmental indicators are plentiful and differences will arise depending on the environmental stage of an organization. Reactive firms tend to comply with

regulation whereas proactive ones would be concerned with means of regulating emissions or disposal of hazardous waste, greenness of products and processes and greener supplier evaluation metrics. Measurement involves determining the rationale of firms' desire to adopt environmental management systems, and, how they have leveraged supply chain capabilities to respond to environmental challenges. Garver, Williams and Lemay (2010) postulate that identifying attribute importance is critical for logistics researchers because it allows for meaningful need-based segmentation. The US Environmental Protection Agency recognizes BSC approach as a good methodology for deploying strategic direction, communicating expectations and measuring progress towards agreed-to objectives (Kanji, 2003).

Ninlawan *et al.*(2010) state that adoption of GSC strategies can be based on an evaluation of a firm's GSCM practices which include internal environmental management, green purchasing, eco-design, cooperation with customers, investment recovery. Performance includes reduction of environmental hazardous products and processes, positive economic and negative economic. GSC pressure evaluated through analysis of the market, regulation and competition should review the impact to firms in varying degrees. Mathenge (2012 envisages that ethical tendering processes in contracting are a factor of green and responsible procurement and supply chain management in Kenya.

2.6 Critique of Existing Literature Relevant to the Study

Majority of the empirical literature reviewed have been carried out in the context of manufacturing firms in developed countries. The studies also focused on individual firms as in case study or product type and the most common was food industry, automotive and electrical and electronics. The researcher was also unable to find a study focusing on drivers in the context of manufacturing firms characteristic of Kenya's situation. In respect to green supply chain strategy there were differing opinions on what should be included. Simpson (2008) recommends a broadening of the scope of the

understanding of potential (GSCM) strategies rather than concentrating on a series of related greening practices without a definite purpose. Despite the relevance of these works, several researchers have also recommended that more empirical research is needed to broaden understanding of the concept and how influence of supplier adoption of green practices can be enhanced (Tate *et al.*, 2011)

From the literature analysis, regulatory and customer pressure highly influenced adoption of green supply chain strategy. In the current research this proposition did not hold. The researcher thus identified research gaps which were filled by focusing on several drivers that influence adoption of green supply chain strategy adoption by manufacturing firms in Kenya which is a developing country. In this study therefore, internal stakeholders and perceived business benefits emerged as the most important drivers contributing to adoption of green supply chain strategy. Lack of awareness and investment cost emerged as factors hindering adoption.

2.7 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 & Strandberg 2008). In assessing the drivers of adoption of GSCS strategies particularly CSR and perceived business benefits, most studies had not factored this shortcoming. This current study factored this aspects and as results would reveal these aspects had implications on the results of the

study. The study involved both developed and developing countries, which leaves a gap for research of specific drivers per country, a reason that justifies the choice of study for Kenya targeting manufacturing firms.

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). Recent studies in Kenya on green or sustainable supply chains reveal that it is becoming increasingly important for firms to re-focus their business strategy to include green supply chain strategy. Sachan and Datta (2005) found there were very few SCM publications on developing and under developed countries and focus should shift now that they are becoming the target of most MNCs either as new market for their products or for sourcing the raw material due to the low cost. Barasa, Namusonge and Iravo (2015) posited that manufacturing companies in developing countries in which Kenya is included are now increasingly taking SCM practices in their business operations to ensure favourable competition globally. The proposition was supported by their study results.

This study targets only registered manufacturing firms with KAM agency as at 2013, thus excluding the tertiary sectors and other non-registered manufacturing firms who play a key role in supply chain management. Ojo *et al.* (2013) posit that GSCM has huge impact on American industry and that though the government of South Africa had exerted pressure and motivation for the construction industry to change, research reports show that the sector remains confined to its old ways of doing business unlike those in other sectors. If a link can be established between green issues related drivers and

adoption of GSCS, then it might be possible to recommend GSCS in promoting a higher response to green issues facing manufacturing firms. Since the study aims to assess the combined effect of various drivers of adoption, further studies can aim at assessing appropriateness of an individual driver.

2.8 Summary

This chapter has examined the existing literature and research issues associated with drivers of adoption of green supply chain strategy by manufacturing firms in Kenya. Supply chain management studies in developing countries are not too many and adding the green aspect makes the studies even fewer. Previous studies are based on developed countries and other types of manufacturing sectors. Even the few in developing countries have not covered some of the sectors covered in this current study. This study also used logistic regression where adoption of the green supply chain strategy was treated as a dichotomous dependent variable. Previous studies had used different approaches and therefore through this study the a less common model (logistic regression) was used for evaluating the extent of adoption of the green supply chain strategy with findings that have elicited different themes for future research.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

The chapter describes the methods and processes followed in this study. The chapter expounds on the research design, population, sampling methodology, data collection procedures and instruments, pilot test, data processing and analysis, operationalization and measurement of the variables. The study adopted both qualitative and quantitative approaches. Standardized statistical procedures were used for data analysis.

3.2 Research Design

The aim of this study was to examine the green issues (drivers) which were construed to have an effect on adoption of green supply chain strategy by manufacturing firms in Kenya. This research was based on post-positivism. According to Creswell (2014) post-positivists hold a deterministic philosophy in which causes (probably) determine effects or outcomes. Thus, the problems studied by post-positivists reflect the need to identify and assess the causes that influence outcomes, such as found in experiments. It is also reductionistic in that the intent is to reduce the ideas into a small, discrete set to test, such as the variables that comprise hypotheses and research questions. To achieve this, the research design was a descriptive research approach combining both quantitative and qualitative research designs. The quantitative research design is said to be more linear and sequential and its logic is deductive than qualitative whose logic is inductive (Creswell, 2014). Kothari (2009) defines descriptive research studies as studies concerned with describing the characteristics of a particular individual, or group, in addition to concern with specific predictions, with narration of facts and characteristics concerning them.

A survey was used to collect data. Shaughnessy, Zechmeister and Zechmeister (2003) cite three survey research designs including cross-sectional design which the authors argue allows researchers to describe the characteristics of a population or the differences between two or more populations, and that correlational findings allow researchers to make predictions. Johnson (2010) posits that collection approach logically flow from the prior decisions of research questions and measurements choices and it is dependent on three factors namely; what the researchers want to know, where the data resides and the amount of resources available. Mugenda (2008) envisages that surveys help quantify social phenomenon particularly of issues, conditions and problems that are prevalent in society. The method of choice for portraying all the variety of a large heterogeneous population is that of sample survey (Shaughnessy *et al.*, 2003).

The manufacturing firms in Kenya are heterogeneous even within the 12 sectors. The large manufacturers in Kenya are subject to environmental regulation EMCA Act (1999), trade Acts and pressure from the market and other stakeholders and they also depend on the natural environment for resources. This formed the basis on which the five key independent variables namely; regulatory pressure, consumer pressure, perceived benefits, CSR and internal stakeholders were assessed in relation to adoption of green supply chain strategy. The study combined 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.

3.3 Target Population

Mugenda (2008) posit that population exist within space and time and researchers unequivocally specify population in terms of category and the geographical space. A population is also viewed as the total collection of elements about which the researcher wishes to make some inferences (Cooper, & Schindler, 2008). The 2013 KAM directory has listing of members (firms) by sectors which contains a register of 12 sectors of those in manufacturing firms spread all over the country. The KAM directory categorizes members per sector which is defined by the type of raw materials they import or the products they manufacture. The population of all the registered members as per the directory was 698. However, for purpose of this study the population of interest was all the registered manufacturing firms as at 2013 KAM register located within Nairobi and its surrounding areas. This study sought a target population within Nairobi and its surrounding areas since there was heavy concentration of the firms within this scope. According to KAM Exporters and Manufacturers directory 2013 (GOK, 2014) 80 percent of the firms are found within Nairobi and its environs. The number of these firms across the 12 sectors therefore gave a target population of 441 firms. The 12 sectors and the target population per sector is given in Table 3.1.

Table 3.1: Manufacturing Sectors

S/No	Sector	Target population	1st stage Sample
1.	Building, Construction and Mining	15	15
2.	Chemical & Allied	61	-
3.	Energy, Electrical and Electronics	33	33
4.	Food & Beverages	98	98
5.	Leather & Footwear	8	-
6.	Metal & Allied	40	-
7.	Motor Vehicle & Accessories	27	-
8.	Paper & Board	53	-
9.	Pharmaceutical & Medical Equipment	21	21
10.	Plastics & Rubber	52	52
11.	Textile & Apparels	22	-
12	Timber, Wood & Furniture	11	-
		441	219

3.4 Sampling Frame

Johnson (2010) describes a sampling frame as a list of all members of the population of interest, with the specific characteristics needed for the research. It has the property that the researcher can identify every single element and include any in the sample (Saunders *et al.*, 2009). To ensure adequate coverage of the population of the large manufacturers in Kenya and ease of access, the sample frame consisted of all the 12 sectors within Nairobi and surrounding area. Additionally, the register provides details of the geographical location of each firm where Nairobi has heavy concentration (80%) of the manufacturers' in its industrial areas rendering it an ideal target location with a sample frame of 441 firms.

3.5 Sample and Sampling Technique

Shaughnessy *et al.* (2003) state that the identification and selection of elements that will make up a sample are at the heart of all sampling techniques. Mugenda (2008) envisage that the accuracy of generalization of research findings largely depends on the degree to which the sample, accessible population and the target population are similar on salient characteristics. 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). Waters (2001) envisage that the benefit of multi-stage sampling approach is that samples are found which are concentrated in a few geographical areas. It is also commonly used in practice as it uses a mixture of two or more methods providing an opportunity to reduce cost and yet remain objective.

The sample was decided on by use of a multi-stage sampling technique. Waters (2001) describes the approach as a stage by stage process which starts by taking a random sample of the population which is divided into categories followed by random selection again of sub-divisions. This process continues until individuals or items are identified from which an appropriate sample is identified. Alreck and Settle (2004) envisage that

stratification can be designed to reduce total sample size drastically as opposed to non-stratified random samples which have to be extremely large to obtain enough respondents of a particular type. To remain objective a reasonable number strata of (5 out of 12) were randomly selected from the 12 in the sampling frame. This was necessary because some of the sectors had few firms whereas others had many who were already heterogeneous. This decision was taken in consideration that strategy adoption is a matter of strategic choice and that they were all operating under the same legal regime in respect of their nature of business. This was also done with a view to use systematic sampling method in the second stage. Kothari (2009) argues that systematic sampling is spread more evenly over entire population, it is easier to use and it is less costly and that it can be conveniently used even in cases of large population.

In the first stage random number 18 obtained from the table of random numbers led to the selection of the 5 strata with random numbers 01, 03, 04, 09 and 10 which were namely; Building, Mining and Construction with 15 firms, Energy, Electrical and electronics with 33, Food and Beverage 99, Pharmaceutical and medical Equipment 21, and Plastics and Rubber 52 firms. The sample size of 80 was deemed appropriate to provide insight on drivers' contribution to adoption of green supply chain strategy. The rationale behind the sample size included cost, variability among the population, sampling method, confidence level and minimum acceptable level of precision. The population size was known (441), confidence level of 95% was assumed and the estimate of the proportion of manufacturing firms who were expected to be adopting green strategy was assumed to be approximately 30% taking account of non response aspect. A sample size between 30 and 500 at a 5% confidence level is generally sufficient (Sekaran & Bougie, 2009). The sample size for this study was therefore 80 firms drawn from 5 different sectors (Appendix 3).

The firms appeared in alphabetical order per sector and in respect of names only (Appendix iii). This permeated the use of systematic random sampling technique in selection of a representative sample size from each stratum without bias. A random start

point and a skip interval for each stratum was identified in line with the technique. The sampling interval (k^{th}) number for each of the stratum was obtained by dividing the population in each strata by its proportionate sample size (Table 3.1).

3.6 Research Instruments

Shaughnessy *et al.* (2003) states that the primary research instrument for survey research is the questionnaire, but retaliates that the questionnaire must yield reliable and valid measures of demographic variables and of individual differences on self report. Further, the quality of the measurements depend on the quality of the instruments used to make the measurements. Questionnaire collect data that can be ideally analyzed both qualitatively and quantitatively in line with the inquiry mode. According to Saunders, Lewis and Thornbill (2009) a questionnaire allow data to be standardized thus enabling easy comparison. 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 questionnaire contained two major sections, the items affecting the adoption of GSCS (drivers) and practices corresponding to adoption of GSCS strategy.

3.6.1 Primary Data

Primary data was obtained through questionnaire designed to gather information from respondents who in this case were the various managers identified as playing having a role in supply chain. Such information and the design of questionnaire was based on secondary data obtained from literature reviewed, the government and other related agencies. The field data aimed at providing empirical information in respect of the supply chain activities from sourcing, resource utilization, distribution and waste management which was covered under the headings, green purchasing practices, DFE (green manufacturing) practices, green marketing practices and reverse logistics practices since the combination defines the dependent variable as a composite scale.

3.6.2 Secondary Data

Review of secondary data obtained from KAM provided general information about the target population and the record of green initiatives and list and characteristic of manufacturers under the umbrella body. National Environmental Management Authority (NEMA), the library, the internet and government agencies were other sources that provided information for the methodology of this study. The contents from historical documents such as Kenya Manufacturers & Exporters directory and newsletters.

3.7 Data Collection Procedure

The questionnaire for this study constituted the tool of data collection targeting managers in procurement/supply chain, environmental management, production or marketing/strategic management. The rationale takes cognizance of the fact that different organizations were bound to delegate the role of environmental and supply chain to different departments or use titles that mean different things. The questionnaire was emailed as an attachment in word format and for those preferring hard copies, research assistants were engaged to drop and pick. The instrument was designed in such a manner to permeate appropriate measurements of the dependent and independent variables. The dependent variable in this study was 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 variables, which constitute pressure or motivators (drivers) for firms to adopt the green strategies across the supply chain; were customer pressure, regulatory pressure, CSR, perceived business benefits and internal stakeholders. The survey items were grouped under each 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.

3.8 Pilot Study

The place of Procurement and supply chain is evolving in Kenya and this coupled with the scarcity of GSC studies encountered in case of Kenya made it absolutely necessary to pretest the survey instrument. Pilot testing was conducted with the aim of identifying weaknesses in design, instrumentation, and to provide proxy data for selection of a sample probabilistically, with a view to refine the same. Reliability evaluates accuracy of the measures through assessing the internal stability and consistency of items in each variable (Sekaran, 2003). The subjects for the pilot were drawn from the target population who were within the randomly selected strata. Similar procedures and protocols to those proposed in the research collection method applied.

Cooper and Schindler (2008) envisage that the subjects for a pilot test need not be statistically selected and for a survey study same method of administering the questionnaire should be used. On this premise therefore, 10 firms drawn from KAM list of manufacturers who in addition were in the study group of the 5 sectors were identified through convenience sampling method. The questionnaire was distributed through drop and pick method. Those identified were then be given a questionnaire together with a letter requesting for interview which also elaborated the questionnaire whose aim was to gather respondent's views and understanding and application of the general concept and terminology of green supply chain strategy.

The results of the pilot study were analyzed for reliability by testing for internal consistency using Cronbach's Alpha test. According to Cooper *et al.* (2008) reliable instruments are robust and they work well at different times under different conditions. Alpha coefficient of 0.7 or above is an acceptable reliability coefficient to advance the use of the instrument after the pilot study, this time with a probability sample drawn from the study target population. All except regulatory pressure had Cronbach's alpha coefficients of above 0.8. Regulatory pressure had a value of 0.683. After the pretesting, modifications were made to ensure adequacy of the measure to quantify the concepts

and also to reduce the possibility of ambiguity of some of the questions before distribution.

3.9 Data Processing and Analysis

According to Sekran (2003) there are three basic objectives of data analysis which include; getting a feel for the data, testing the goodness of the data and testing the hypotheses developed for the research. 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. Quantitative aspect of a research is based on the numerical measurements, that is, the amounts of characteristics which can be expressed in terms of numbers (Kothari, 2009). 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. Zikmund *et al.* (2010) posit that modifying attitudes is a key ingredient in developing strategies to address goals set by organizations. Further, the affective, cognitive and behavioral components of an attitude may be measured by different means which may include rating to estimate the magnitude or the extent to which some characteristics exists.

3.9.1 Data Analysis

The main data for this study was collected through questionnaire designed to collect respondent's views through closed ended and open ended questions. There were five research objectives for this study upon which the questionnaire was formulated. They made reference to the five independent variables and the dependent variable. Data obtained from the survey was both qualitative and quantitative and it was coded and subjected to various tests and analyzed in three major steps as follows:

Step 1: This involved descriptive analyses carried out to gain better insight into the data where the measures of central tendency including median, mean and percentages were obtained and interpretations made.

Step 2: This is univariate analysis to test unconditional association of variables with the outcome. These tests led to tests for regression analysis assumptions. In case of logistic regression normality and homoscedasticity are not applicable. Instead, this study made use of factor analysis, Cronbach's Alpha test of reliability, tests of significance, test of multicollinearity and variable transformation. Factor analysis was used to help summarize a multitude of measurements without losing too much information that was collected by establishing a set of questionnaire items with same underlying factor. Conversely Likert scale categories containing more than five categories of responses were treated as interval measures. This in addition was used to assess sensitivity of the measurement of the hypothetical constructs of this study which was achieved first by having more categories on the scale before converting them to dichotomous categories in respect of the dependent variable.

The dependent variable in this study is adoption of green supply chain strategy which is dichotomous. Zikmund (2010) posit that the choice between single and an index measure depends on the complexity of the issue to be investigated, the number of dimensions the issue contains, and whether individual attributes of the stimulus are part of a holistic attitude or are seen as separate items. Repko (2012) noted that a dichotomy exists between theories dealing with the environment and those dealing with economics. There are conflicting values notably between how environmentalist and economist refer to wealth, hence the need to modify concepts embedded in such theories. Strategy and green issues are complex and considering that a green supply chain strategy is one that combines several facets of the supply chain, index measures as opposed to single measures were deemed appropriate.

Frenz, Nielson and Walter (2011) envisage that all social phenomena is the sum total of individual choices involved and that all forms of interactions are portrayed as exchange relations in the manner of marketplace and all human choices are seen as a product of rational decision making. The attempt to develop models of social relationship and intentional actions based upon rational choice calculations is taking centre stage in current social sciences. The independent variables were ordinal and with logistic regression independent variables need not be metric and homoscedasticity is not necessary. The quantified strength of the association of the variables obtained was used to explain the significance of the relationship between variables. Cooper and Schindler (2011) envisage that evaluation of the importance of a statistically significant difference can be determined by weighing the practical significance of any change that is measured.

Step 3: Test of hypotheses follows in this stage. Easterby-Smith *et al.* (2008) envisage that hypothesis testing is about making inferences about populations based on samples drawn and that it allows the researcher to define how safe it is to go beyond a specific sample of data. Logistic regression was preferred to Chi-square because it allows for inclusion of more than one dependent variable which may be either dichotomous or ordinals as was the case with the data collected in this study. In addition, the accuracy of the hypotheses is evaluated by determining the statistical likelihood that the data reveal the true differences. This according to the sampling-theory approach assumes an objective view of probability in which the decision making rests totally on an analysis of available data collected. The Wald test is used to determine statistical significance of each individual independent variable and the relationship of each with the dependent variable was used to compute the coefficients for the regression equation all at a go.

Sachan *et al.* (2005) envisage that data analysis techniques help in summarizing large amount of data, and in minimizing the confounding effects inherent in most questionnaires. In their study on review of SCM and logistics research, behavioral and economic approaches influence these researches hence the prevalence of positivist

method. There is limitation of quantitative methods because of interdependence among supply chain hence the need for triangulation. The survey questionnaire was structured into four major sections namely; demographics which collected data on sector and firm size, the predicted five drivers, the green supply chain practices and factors hindering adoption. 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 would later be collapsed to two categories, that is, those scoring 5 and 4 (very high 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. Zikmund *et al.* (2010) exemplify use of index measures to assign value based on how much of the concept being measured is associated with an observation.

The measure of central tendency for this study was median and the frequencies of the ordered scores were presented in percentages. Cooper *et al.* (2011) posit that median is the most appropriate locator of center for ordinal data and has resistance to extreme scores, thereby making it a preferred measure for Likert type data wherefore the distributions are not normal. Easterby-Smith, Thorpe and Jackson (2008) envisage that with median every observation in the data contributes something to determining the value of the median, unlike the mode. This therefore makes the median a more meaningful measure of location, in that it uses more of the information in the data in determining location.

First, in order to provide a description of the sample from which data was collected, descriptive data of the category of the firm, size, supply chain function, and green practices were described, as well as the means, median and standard deviations of drivers and adoption of the strategy. Factor analysis was performed on grouped scale items of each of the five independent variables to ascertain their level of significance in the study. According to Zikmund *et al.* (2010) item analysis of large number of statements in the questionnaire ensures that final items evoke a wide response and

discriminate among those with positive and negative attitudes. Zhu *et al.* (2005) used exploratory factor analysis to derive groupings of GSCM pressures, practice and performance which they advanced further by performing test of reliability of the factors identified in each group.

The dependent variable of this study was categorical hence the reason for modeling the empirical data obtained and also to normalize it. Sachan *et al.* (2005) notes that logistic regression and correlation analysis are popularly used to infer influences of strategic decision making in SCM, but retaliates that despite correlation analysis being good in overcoming the problem of multicollinearity it ignores the co-existence of other attributes, which renders it an unrealistic assumption. Multicollinearity results in very strong correlation of the independent variables and in some instances the result seem paradoxical where data fit well (high F-test) even though none of predictor variable has a statistically significant impact on explaining the dependent variable. Use of factor analysis or use of joint hypothesis tests instead of doing t-tests for individual coefficients are some of the ways of dealing with problems of multicollinearity. This study made use of factor analysis because it helps inform on changes that need to be made in respect of what items to drop or add. SPSS tool of data analysis informs of the presence of multicollinearity in a model through variance inflation factor.

Alreck *et al.* (2004) envisage that where there are two continuous intervals or ratio variables, one of which is dependent and the other independent, regression analysis is the appropriate technique to measure the relationship between them and assess significance. 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, though with multiple regression independent variables may be categorical or interval. Logistic regression analysis examines influence of various factors on a dichotomous outcome by estimating the probability of the events occurrence. This study was based on the assumption that independent variables were not linear functions of each other. This was

necessary to obtain the coefficients of the five independent variables and for purposes of testing the null hypotheses. Logistic regression was used to examine the relationship of the five variables (drivers) 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 variables. The model took the form presented below:

$$\ln(Y) = \alpha_0 + \alpha_1 X_1 + \alpha_2 X_2 + \alpha_3 X_3 + \alpha_4 X_4 + \alpha_5 X_5. \text{ Where,}$$

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 = Regulatory pressure

X_2 denotes = customer pressure

X_3 denotes = Perceived business benefits

X_4 denotes = CSR

X_5 denotes = Internal stakeholders

$\alpha_1 \dots \alpha_5$ denote the coefficients, α constant

The model was used in explaining the outcome in terms of degree of adoption against those adopting and those not adopting the green supply chain strategy.

CHAPTER FOUR

RESEARCH FINDINGS AND DISCUSSIONS

4.1 Introduction

The overall objective of this study was to determine how the five drivers (regulatory pressure, customer pressure, perceived business benefits, CSR and internal stakeholders) contributes to adoption of green supply chain strategy by manufacturing firms in Kenya. To address this objective, this chapter provides a detailed descriptive and inference on the data analysis and the key research findings and discussions, clearly outlining how each of the hypothesized condition has been tested.

4.2 Background Information

4.2.1 Manufacturing Firms Response Rate

This was a survey study that targeted 80 manufacturing firms in Nairobi and its environs. The questionnaire was targeted to senior officers engaged either in procurement and supply chain management, environment, production/operations, marketing or strategic management. After coding and checking for accuracy in the data, 70 questionnaires were found useful for the study. The response rate was therefore 87.5 percent. According to Mugenda (2008) a response rate of 50% or more is adequate. Table 4.1 gives a representation of the five sectors, the number of questionnaire documents issued and those returned and found acceptable for analysis and reporting of results.

Table 4. 1: Manufacturing Firms' Distribution and Response

Manufacturing Firms Issued	Questionnaires	Respondents
Building, Construction and Mining	9	9
Energy, Electrical and Electronics	12	12
Food and Beverage	38	30
Pharmaceutical and Medical	8	7
Plastics and Rubber	20	12
Total	80	70

4.3 Descriptive Results

The starts with a presentation of general characteristics of those who responded. These results are presented and discussed under the headings in the questions which were constructed in respect of the study objectives. The main study objective was to examine drivers of adoption of green supply chain strategy by manufacturing firms in Kenya.

4.3.1 Manufacturing Sectors and Title of Officer Involved in Supply Chain/Environment

This study targeted five sectors namely Building & Construction, Energy, Electrical & Electronics, Food & Beverage, Pharmaceutical & Medical Equipment, and Plastics & Rubber. Questionnaires were distributed proportionately and all those surveyed in Building & Construction and Energy, Electrical & Electronics responded. Food & Beverage had the highest proportion but this sector is highly heterogeneous and one of the few sectors that relied on raw material produced locally. Table 4.1 shows the distribution of the respondents as surveyed. The survey reveals that those who filled the questionnaire were in management and most of them had a role in either

Procurement/Supply Chain, Production or Environment. A total of twelve respondents did not indicate their titles.

4.3.2 Firm size

The size of the firm was assessed by two parameters which include number of employees and annual turnover. Employees play a pivotal in strategy adoption which is in line with the institutional theory. Internal stakeholders is hypothesized as a driver of green supply chain management in this study and hence the need to evaluate the firm size in terms of number of employees and even decision makers. Kenya is not highly industrialized and most manufacturing firms require large numbers of human labour. Figure 4.1 represents the composition and proportion of employees in firms surveyed.

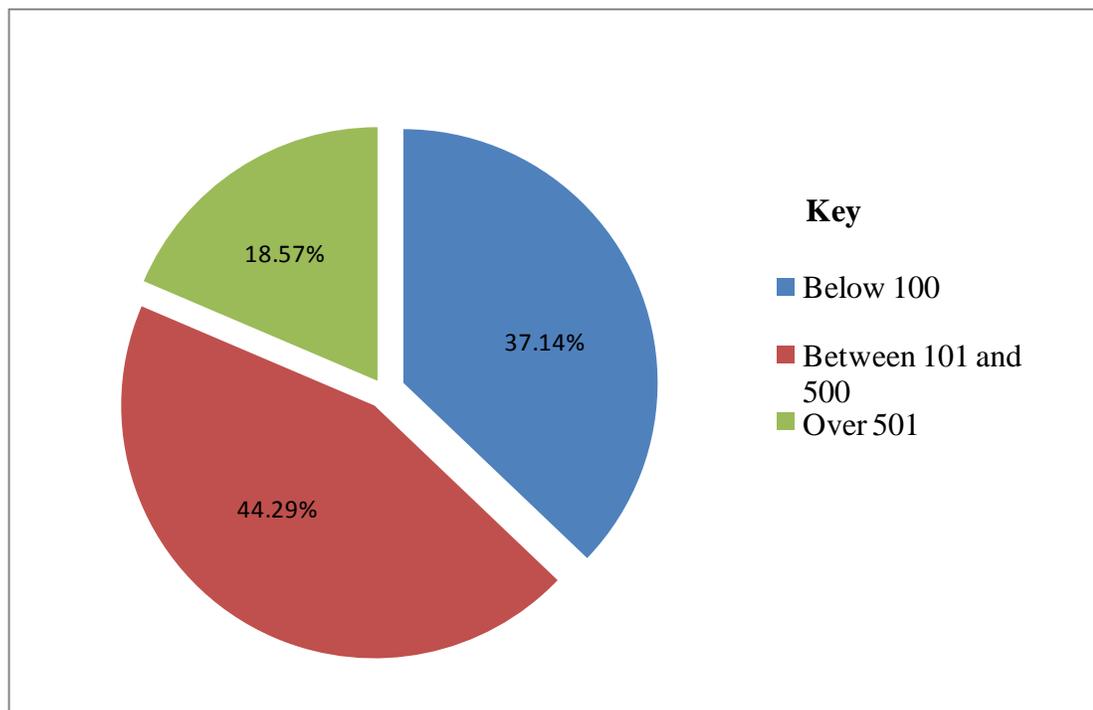


Figure 4. 1: Number of Employees

The study shows that 13 firms out of 70 employed more than 500 employees which is equivalent to 18.6%. 31 firms employed between 101 and 500 employees whereas 26 employed below 100 employees translating to 44.3% and 37.1% respectively. The study reviews that more than 60 percent of firms surveyed employed more than 100 employees.

4.3.3 Firm Turnover

The size of the firm was also assessed by the factor of annual turnover. Turnover is an indicator of how large a firm is and as per the description, large firms are registered by KAM and they are the main target of environmental bodies. Turnover was sub-divided into three categories to allow for greater inclusivity and to get a better feel of the data. The results are represented in Figure 4.2.

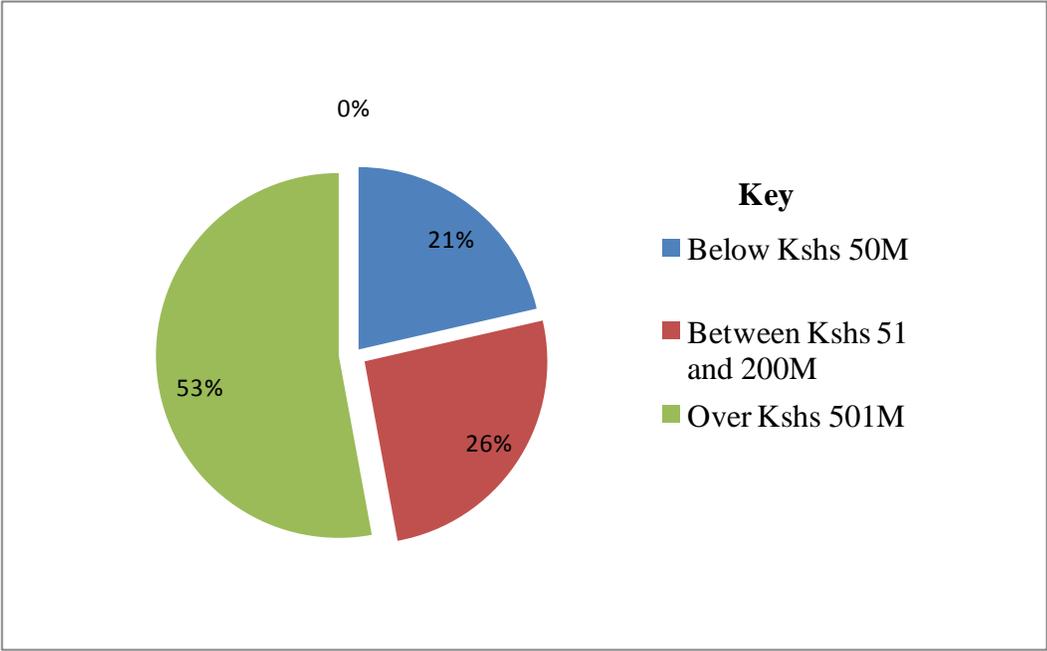


Figure 4. 2: Annual Turnover

The results show that 37 out of the 70 firms had turnover of over Kenya shillings 501 million which represents 53% of the respondents. Those with turnover of between 51M to 200M were 18 or 26% while those with turnover of less than 50M were only 15 or 21%. The results correspond with the description of the target population where the subjects are described in the Overall firms employing more than 100 employees represent approximately 63 percent and those with turnover of more than 200 million being 78 percent. This empirical data supports the notion that firms registered with KAM are basically large manufacturing firms in Kenya.

4.3.3 Assessing the Influence of Regulatory Pressure

Respondents were presented with eight questions which were evaluated by assessing extent of influence to adopt GSCS strategy ranging from very high extent to not all. This was followed by open-ended questions seeking to gather information on other government policies which could be playing a role.

Table 4.2: Influence of Regulatory Pressure

Regulatory Pressure (5=Very high 1=not at all)	Very high	High	Mod erate	Low	Not at all	Median
i. Pressure to comply with various Acts that have implication to the environment	34.3	32.9	18.6	5.7	8.6	4
ii. Pressure to comply in order to secure tenders	25.7	14.3	20.0	11.4	28.6	3
iii. Loss of business due to new regulatory policies on imported raw materials	4.3	20.0	21.4	14.3	40.0	2
iv. Trade barriers due to lack of international certification	12.9	12.9	21.4	20.0	32.9	2
v. International restrictions on shipment of goods	18.6	20.0	17.1	20.0	24.3	3
vi. Pressure from environmental regulations in other countries	10.0	21.4	25.7	21.4	21.4	3
vii. Regional environmental regulations	14.3	24.3	18.6	17.1	25.7	3
viii. Pressure to comply with annual environmental audits and perpetual inspections	28.6	25.7	24.3	7.1	14.3	4
Average Percentages	18.6	21.4	20.9	14.6	24.5	

The median of the responses to the eight questions were obtained and the results indicate that pressure to comply with various Acts that have implication to the environment for example, EMCA, OSHA and Water Act, and pressure to comply with annual environmental audits and perpetual inspections had a median of 4 where 4 is high

influence. Very high and high has a percentage of 67.2 % which agree with the proposition that firms may adopt green strategies to comply.

Regulatory policies affecting imported raw material had a median of 2 where 2 is low influence. Comparing the two extremes show that the percentage of those responding to not at all is 40% while those responding to the very high influence is 4.3%. It can be inferred that manufacturers in Kenyan do not consider such threat a serious issue and this is quite evident in light of the use of polythene paper bags and the scale of polythene waste in Kenya. Ban on use of plastic packaging bags was one such ban which did not pick up in Kenya.

Trade barriers due to lack of certification had a median of 2. Pressure to comply in order to obtain tenders, despite having a median of three had the highest percentage of respondents not in agreement. Hitchcock (2012) envisages that policy pressures through public procurement were significant in large economies like United Kingdom (UK) where this was reflected through contractual provisions for supply to public authorities and in the tendering procedures. The other four factors which include regional and international green pressures had a median of three. Response to the open ended questions reveal that the factors listed in this category were almost exhaustive with some citing that their internal controls were more stringent than those set by the government. The summary of these findings for the combined factors under the variable regulatory pressure show that 40 percent of the respondents agree to a very high and high extent that regulatory pressure influence them to adopt green supply chain strategy. 20.9 percent agreed to moderate extent while 39.1 percent reveals that regulatory pressure had either low or no influence at all.

4.3.4 Assessing the Influence of Customer Pressure

Customer pressure was postulated as one of the drivers of adoption of green supply chain strategy. To assess its influence on adoption, respondents were presented with a

series of attitude statements with ratings of 5 to 1 where 5 is very high influence and 1 not at all as tabulated in Table 4.3.

Table 4. 3: Influence of Customer Pressure

Customer Pressure (Ranging 5= very high and 1=not at all)	Very High	High	Moderate	Low	Not at all	Median
i. Loss of customers whose demand for greener products is not met	5.7	10.0	31.4	28.6	24.3	2
ii. Disposal and transport issues/challenges	11.4	22.9	22.9	24.3	18.6	3
iii. Shortage of quality raw materials as critical input to your operations.	14.3	18.6	28.6	24.3	14.3	3
iv. Pressure from suppliers demanding green standards (ISO 14001)	8.6	12.9	34.3	24.3	20.0	3
v. Pressure from NGOs, green movements, and financing institutions who may demand a good environmental policy	2.9	37.1	22.9	22.9	14.3	3
vi. Pressure from the community for want of safer and cleaner environment	20.0	21.4	32.9	12.9	12.9	3
vii. Marketing of green products by marketers/competitors	15.7	20.0	37.1	14.3	12.9	3
Average Percentage	11.2	20.4	30.0	21.7	16.8	

The seven questions responded to under this variable had a median of 3 except loss of customers whose demand for greener products was not met. This factor had a median of 2 which means this had very low or no influence at all. The findings show percentage for this factor as 19.5% for combined very high and high extent, whereas low and not at all combined is equivalent to 53%. Respondents were drawn from five heterogeneous sectors some of which are monopolistic or oligopolistic and yet others are highly competitive having several channel members. Disposal and transportation was challenges were at average which can be attributed to the heavy concentration of firms industrial areas accessible by rail and road. Kenya has sea ports which make it easier for shipment by sea which has less environmental impact than airfreight.

Shortage of essential raw materials had a median of 3 which is still moderate and hence it is not a major area of concern. The construction industry for example, benefits heavily from mining of stones, sand harvesting, ballast, cement which are found in Kenya in plenty. The food and beverage benefits from locally produced agricultural inputs and in case of water, there is plenty of clean underground sources. Kenya is a major producer of food and beverage products for the foreign market and incidents have been noted where supply of fish, fresh produce and cut flowers have been hampered for want of particular standards and conditions for production and transportation. This sector is one of the five targeted and as may be noticed, the rest of the sectors either import raw material or consume the end product locally hence the low impact. These results indicate that firms do not appear to be hard hit in light of this aspect.

Pressure from the community for want of cleaner environment and pressure from NGO and financial institutions are the only two factors that come close to having some significance pressure at combined high and very high of just about 40 percent. Most of the manufacturing firms in Kenya are located in places not close to homes and in setting up a factory one would have to be subjected to serious scrutiny and certification.

Marketing of green products by marketers and competitors was scored at a median of 3 where the percentage of those feeling that the pressure is on moderate was the highest at 37 percent. This means a lot in this study even the fact that firms and customers alike could be lacking some vital knowledge hence not too certain whether the products are important or not.

4.3.4 Assessing the Influence of 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 and two semi open ended questions relating to profitability since adoption of green supply chain strategy is construed to have an impact on profitability. The median and percentages of particular responses are as presented in the Table 4.4.

Table 4.4: Influence of Perceived Business Benefits

Perceived Business Benefits	Very high	High	Moderate	Low	Not at all	Median
(Influence to adopt where 5= very high and 1=not at all)						
i. 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	

Cost effectiveness 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 agreeing to this proposition is 68.6 % at very high and high. Only 12.8% felt that performance would not improve. 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.

Easy access to foreign markets is an assurance of a market for a firm's produce and this can be strong driver of change. In an economy like Kenya with her best exchange earner as agricultural produce, firms ultimately seek 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. This can be attributed to the characteristic of the manufacturing firms studied where only one sector - food and Beverage, relied on local raw material supply production in addition to export of their produce.

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

Receiving innovative green/environmental awards was not highly valued as per our study results which show that 37.2% associated adoption of green strategy with awards. The median of 3 indicates that this was an average response. Earning of carbon credits in addition was not popular either where 30% of the respondents indicated 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.

Profitability was assessed through semi-structured questions and the study revealed that out of fifty firms that affirmed that adoption of green supply chain strategy was profitable, forty firms confirmed growth in profitability in the range of 6 percent to 15 percent where measurable. Yenming and Chen Yen-Chun Jim Wu Tiehua Wu (2015) found evidence indicating that green practices especially in the supply chain, not only reflect environment responsibility of firms toward society but also show strategic aims of these firms in relation to improving competitiveness and minimizing risk of business interruption.

4.3.5 Assessing the Influence of Corporate Social Responsibility

Corporate Social Responsibility was seen as a popular trend in the country and as such this study sought to assess its influence on adoption through a number of statements. The seven statements were evaluated using 5point Likert scale. Additional questions were in form of open-ended questions relating to the number and type of Corporate Social Responsibility projects or activities firms had undertaken with a given period. The results are presented in Table 4.5.

Table 4. 5 Influence of Corporate Social Responsibility

Corporate Social Responsibility (5= Very high influence to 1= not at all)	Very high	high	Moderate	Low	Not at all	Median
i. Desire to be market leader in green initiatives	40.0	22.9	21.4	5.7	10.0	4
ii. Desire to promote societal welfare	32.9	32.9	27.1	4.3	2.9	4
iii. Believe that it is your firm's responsibility to minimize negative environmental effects on the natural environment	42.9	34.3	15.7	5.7	1.4	4
iv. Firm's desire to prevent environmental problems such as global warming and water pollution.	45.7	32.9	15.7	2.9	2.9	4
v. Improved organizational image	37.1	32.9	20.0	7.1	2.9	4
vi. Ethical and moral obligation	29.0	43.5	17.4	2.9	7.1	4
vii. To underscore the commitment in your service charter	28.6	34.3	21.7	5.8	8.6	4
Average Percentages	36.6	33.4	19.9	4.9	5.1	

Corporate Social Responsibility (CSR) stood out as the most outstanding driver with all the seven factors scoring a median of 4. The results show that firm's desire to be market leader stood at 62.9 percent for very high and high combined. Market leadership is an aspect considered in matters of strategy in reference to an organization's vision. Firm's desire to promote societal welfare was rated at 65 percent for very high and high combined. Firm's believe that it was their responsibility to minimize negative environmental effects and firm's desire to prevent environmental problems were the two highest rated activities at 78 percent for very high and high combined. Firms desire to mitigate against environmental problems.

On average 70 percent responded to the factors construed to be drivers of adoption of green supply chain strategy from a CSR point of view. There is increased hype in CSR where tree planting takes the centre stage. Despite the high rating none of the firms surveyed recorded implementation of more than three CSR activities. These results reveal that it is obvious to adopt some form of green practice especially if it does not have serious financial implication. Seuring (2011) noted that in a study of implementation of environmental and social standards in the automotive industry in Germany, almost all firms implemented environmental standards but not social, a situation the researchers have attributed to one of those minimum requirements firms need to fulfill to stay in the market.

4.3.6 Assessing Influence of Internal Stakeholders

Internal stakeholders reaction to green issues was assessed using the variables internal to an organization. These variables include the influence of top management and employees on issues whose solution would be sought through adoption of green supply chain strategy. The 5 point Likert scale assessed the nine aspects of internal stakeholders as represented in Table 4.6.

Table 4.6: Influence of Internal stakeholders

Internal Stakeholders Influence (Likert scale 5-1)	Very high	High	Moderate	Low	Not at all	Median
i. Priority of CEO and/or Board of Directors	42.9	20.0	27.1	4.3	5.7	4
ii. High cost of energy	30.0	35.7	17.1	10.0	7.1	4
iii. High cost of production inputs	32.9	25.7	25.7	5.7	10.0	4
iv. Employee low morale related to green issues	11.4	17.1	31.4	12.9	27.1	3
v. Complaints due to high health and safety premiums	11.9	31.3	22.4	14.9	19.4	3
vi. Employee level of awareness of environmental issues	8.7	17.4	30.4	27.5	15.9	3
vii. Firm's desire to participate in climate change campaign	22.9	22.9	35.7	14.3	4.3	3
viii. Marketing departments environmental priority for green image	28.6	25.7	21.4	14.3	10.0	4
ix. Increased hype for products with green element	18.8	24.6	29.0	18.8	8.7	3
Average percentages	23.1	24.5	26.7	13.6	12.0	

Priority of the CEO and/or Board of Directors showed that on a scale of 5 where 5 is very high influence and 1 is not at all in respect of pressure to adopt green strategy/practices, was 62.9% of the respondents who agreed that the CEO was a force to reckon with. The median for this response was 4 out of 5. High Cost of energy and production results revealed that 65 percent of the respondents agreed at very high and

high that high cost of energy and production were pressures which would be mitigated by a adoption of green supply chain strategy. The median for this variable was 4.

The response on employees in relation to employee morale due to green issues, complaints due to health and safety premiums and employee level of awareness of environmental issues all had below 11% for very high influence and a median of 3 signifying that the issue at hand was not an effective indicator of pressure to adopt. Conversely, employee level of awareness of environmental issues appears to have the least influence at a score of a median of 3. This together with low employee morale due to green issues and complaints due to high health premiums were not posing a challenge. Kenyan manufacturing firms are labour intensive with the sector employing 2 million people as per the Economic Survey of 2014 (GOK, 2015).

Marketing departments environmental priority results reveal that 65% percent agree at combined very high and high that the department influenced adoption of green practices. The median was 4 hence a high influence. The result show that the firms were more focused on external customer needs than the employees. Firms desire to participate in climate change campaigns and increased hype for products with green element were among those that had low rating at very high and high. Thus, only 45% responded to very high and high to pressure or influence to act in this way in respect of green issues affecting their firm. The median was 3 which represents moderate influence. This shows that the needs of the customers were met as far as the organization was concerned. From this production point of view, the results indicate that only about 43% were influenced by green issues to produce products with a green element. This study reveals most of the practices considered by most of the firms studied are those that top management considered important.

4.3.7 Adoption of Green Supply Chain Strategy (Green Practices)

A green supply chain strategy is one characterized by an aggregate of green purchasing, green manufacturing (design for environment), green marketing and reverse logistic practices. Respondents were presented with a range of statements with characteristic of green supply chain mix to assess the extent of adoption of the green supply chain strategy. They indicated what their organizations were doing in a relation to mitigate or to take advantage of the green issues. The results of the study are presented in Table 4.7.

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 returned products or scrap material. The five are key in green manufacturing and reverse logistics. 9 out of 16 responses had a median of 4 and overall 53.4 percent responded to very high and high in respect to the practices that constitute green supply chain strategy.

Table 4. 7: Adoption Green Supply Chain and Practices

Green Supply Chain Practices (Very High = 5 to not at all =1)		Very high	High	Mod erate	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	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 for example; 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 - 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	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	

The results presented in Table 4.7 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.

4.3.8 Hindering Factors of Adoption of Green Supply Chain Strategy

The study sought to explore factors hindering adoption of green supply chain strategy and results are as tabulated in Table 4.8.

Table 4.8: Hindering Factors

Hindering Factors (Very high =5 and Not at all =1)	Very high	High	Moderate	Low	Not at all	Median
i. Investment costs	40.6	23.2	17.4	10.1	8.7	4
ii. Lack of management support	14.3	27.1	28.6	18.6	11.4	3
iii. Lack of government support	22.9	20.0	41.4	5.7	10.0	3
iv. Lack of understanding of the concept and its benefits	14.5	31.9	24.6	15.9	13.0	3
v. Lack of awareness due to limited examples locally	26.1	26.1	26.1	8.7	13.0	4
vi. Lack of technical expertise by regulators and other proponents	22.1	25.0	26.5	19.1	7.4	4
vii. Existence of other techniques or initiatives	11.6	17.4	42.0	13.0	15.9	3
viii. Lack of involvement of employee by management	17.4	18.8	33.3	18.8	17.4	3
Average Percentages	21.2	23.7	30.0	13.7	12.1	

This study results indicate that 63.8 percent of the respondents consider investment costs as major hindrance at very high and high extent. Lack of awareness was second in line at 52.2 percent for combined 5 and 4. Lack of management support, lack of understanding of the concept and its benefits, existence of other techniques or initiatives and lack of involvement of employees by management do not appear to seriously hinder adoption of GSCS. In assessing internal drivers such as perceived business benefits, CSR and Internal stakeholders, the results seem to be consistent this outcome. Lack of awareness and complaints from employees did not manifest themselves as strong influencers.

4.4 Inferential Statistical Analysis

4.4.1: Factor Analysis for Regulatory Pressure

Factor analysis was conducted on the factors postulated for regulatory pressure to identify those underlying factors that explain a larger number of other related variables in a parsimonious way. The results of the factor loading are presented in Table 4.9.

Table 4. 9: Factor analysis for Regulatory Pressure

Components	1 extraction
Pressure to comply with various Acts that have implication to the environment	.489
Pressure to comply in order to secure tenders	.419
Loss or closure of business due to new regulatory policies or imposed ban on use of certain materials that are critical to your operations	.623
Trade barriers due to lack of international certification such as ISO 14001 and Kyoto protocol.	.780
International restrictions affecting shipment of goods	.716
Pressure from environmental regulations in other countries	.850
Regional environmental regulations like Rwanda who prohibits use of polythene bags	.735
Pressure to comply with annual environmental audits and perpetual inspections	.667

Extraction method: Principal component method - 1 component extraction

The findings of the study indicated that all factors after analysis reported test results above 0.4 which shows that all the items studied were in support of the study. Pressure to comply to various acts and pressure to comply in order to get tenders are the only two factors with weak factor loadings between 0.419 and 0. 6.

4.4.2: Factor Analysis for Customer Pressure

Factor analysis was conducted on the factors postulated for customer pressure to identify those underlying factors that explain a larger number of other related variables in order to consider the most important ones in subsequent analysis. The results of the factor loading are presented in Table 4.10.

Table 4. 10: Factor Analysis for Customer Pressure

Components	1Extraction
Loss of customers whose demand for greener products is not met	.619
Disposal and transport issues/challenges	.502
Shortage of quality raw materials as critical input to your operations.	.757
Pressure from suppliers demanding green standards e.g ISO 14001	.818
Pressure from NGOs, green movements, and financing institutions who may demand a good environmental policy	.751
Pressure from the community for want of safer and cleaner environment	.677
Marketing of green products by marketers/competitors	.677

Extraction method: Principal component method - 1 component extraction

The findings of the study indicated that all factors after analysis reported test results above 0.5 hence supports the study without need for removal of any of the factors in subsequent analysis.

4.4.3: Factor Analysis for Perceived Business Benefits

Factor analysis was conducted on the factors postulated for perceived business benefits to identify those underlying factors that explain a larger number of other related variables in order to consider the most important ones in subsequent analysis. The results of the factor loading are represented in Table 4.11.

Table 4. 11: Factor Analysis Perceived Business Benefits

Component Matrix	1 extraction
Operational efficiency and cost effectiveness e.g innovativeness resulting in use of cheaper alternatives	.684
Marketability of green products – perception that green products are more marketable	.748
Easy access to foreign markets	.782
Competitive advantage	.616
Improved customer-supplier relationships	.770
Receiving innovative green/environmental awards	.748
Earning of carbon credits – to what extent do you consider it important	.581

Extraction method: Principal component method - 1 component extraction

The findings of the study indicate that all the factors reported test results above 0.5 implying that all the factors considered were in support of the study in respect of perceived business benefits.

4.4.4 Factor analysis for Corporate Social Responsibility

Factor analysis was conducted on the factors postulated for Corporate Social Responsibility to identify those underlying factors that explain the larger number of other related variables in order to consider the most important ones in subsequent analysis. The results of the factor loading are represented in Table 4.12. The findings of the study reveal that all the factors after analysis reported test results above 0.5. Thus all the factors were taken into account in subsequent examination of effects of CSR on adoption of green supply chain strategy.

Table 4. 12: Factor Analysis for Corporate Social Responsibility

Component matrix	I extraction
Desire to be market leader in green initiatives	.574
Desire to promote societal welfare	.803
Believe that it is your firm’s responsibility to minimize negative environmental effects on the natural environment	.713
Firm’s desire to prevent environmental problems including global warming and water and air pollution.	.704
Improved organizational image	.740
Ethical and moral obligation	.648
To underscore the commitment in your service charter	.650

Extraction method: Principal component method - 1 component extraction

4.4.5 Factor Analysis for Internal Stakeholders

Factor analysis was conducted on the factors postulated for internal stakeholders to identify those underlying factors that explain the larger number of other related variables in order to consider the most important ones in subsequent analysis. The results of the factor loading are represented in Table 4.13. The findings of the study shows that all

factors reported test results above 0.5 hence a good indicator of support of the factors postulated as internal stakeholder drivers.

Table 4. 13: Factor Analysis for Internal Stakeholders

Component Matrix	1 extraction
Priority of CEO and/or Board of Directors	.618
High cost of energy	.771
High cost of production inputs	.756
Low employee morale related to green issues	.625
Complaints due to high health and safety premiums	.832
Employee level of awareness of environmental issues	.704
Firm's desire to participate in climate change campaigns	.555
Marketing departments environmental priority for green image	.834
Increased hype for products with green element	.629

Extraction method: Principal component method - 1 component extraction

4.4.6 Factor Analysis for Green Supply Chain Practices

This variable constitutes the dependent variable of our study and several factors were considered ranging from source of raw materials to the end consumption/end of useful life of a product and addressing the processes therein. A total of sixteen factors were considered through use of 5point Likert scale and an additional open ended questions were also presented to respondents. The purpose of this analysis is to help reduce or remove factors which do not have significant importance in the study. The results are presented in Table 4.14.

Table 4.14: Factor Analysis for Green Supply Chain Practices

Component Matrix	1 extraction
Eliminate/reduce hazardous /toxic materials from products	.901
Eliminate/reduce hazardous /toxic chemicals from manufacturing processes	.898
Implement design for environment practices in product development and to reduce, or repurpose manufacturing waste	.662
Reduce energy consumption in manufacturing and buildings	.679
Increase the use of renewable energy sources such as solar, wind, geothermal	.561
Optimize transportation operations to reduce carbon footprint	.728
Recycle returned products or scrap material	.701
Reduce packaging	.748
ISO certification - ISO 14001, ISO 22000 and ISO 9000:2008	.623
Improved capacity utilization	.667
Increased campaign for green products, processes and activities	.664
Use of green criteria in technical specifications of contracts	.639
Ethical and responsible tendering approaches	.771
New company environmental policy	.607
Participation in award winning environmental programmes	.860
Increased green awareness training and campaigns	.738

Extraction Method: Principal Component Analysis.

The results of the factor analysis portray values of above 0.5. The factors are considered hence relevant for use in further analysis of our study.

4.5 Data Transformation for Inferential Analysis

Johnson (2010) envisages that regression analysis helps a researcher to understand both the strength of the relationship and the impact of the independent variables on the dependent variable. 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. Sekaran and Bougie (2009) posit that logistic regression allows the researcher to predict a discrete outcome from a set of continuous, discrete, or dichotomous nature. GSCS adoption is a 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 $y = \ln x / 1 - x = \text{logit}(x)$.

Y=1 was obtained by combining the Likert scale values 4 and 5 representing high and very high response to green practices. Y=0 was obtained by combining 1, 2 and 3 which were viewed as weak indicators of adoption. Zikmund *at el.* (2010) envisage that the sensitivity of a measure of responses and to ensure accuracy in validity of the concept being measured can be improved in the case of dichotomous responses by having numerous category scales which can be added together. In obtaining the values of Y in this study this approach was taken. The means of the dichotomous measures computed were used for further analysis of the study results. The five independent variables were retained in their original categorical measures and their means computed to aid further analysis. The five variable means are presented through bar charts to shed more light on the pattern or trend of the responses. The frequencies of the means per variable appear on the y-axis whereas the means obtained appear on the x-axis. The height shows how many respondents recorded a particular answer as given by the mean.

4.5. 1 Average Means of Regulatory Pressure

The means of the variable regulatory pressure obtained after factor analysis are denoted by X1. The means of the responses were obtained and the frequencies of the responses are displayed through use of bar chart as represented in Figure 4.3.

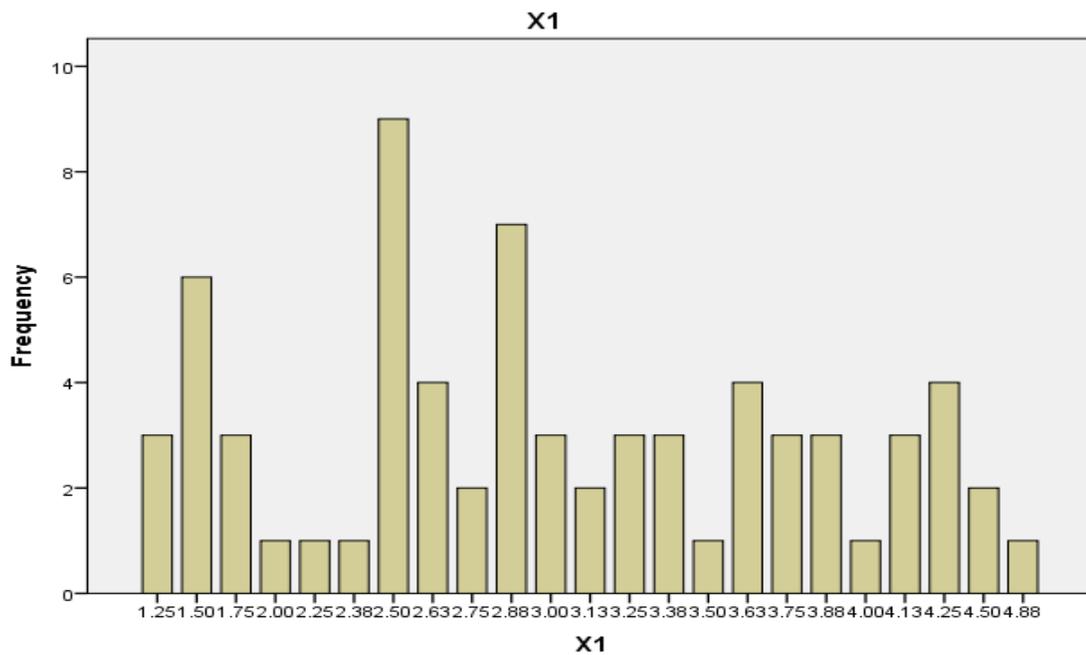


Figure 4. 3: Average Means of Regulatory Pressure.

The results show that mean with the highest frequency is 2.5 followed by 2.88 and beyond this the frequencies are relatively low. These outcomes compare well with the range of median obtained per factor where there were scores of 2 and 3 at high percentages. A mean of less than 2.5 indicates less pressure is experienced from regulatory forces. These results show that the firms tend to behave in a passive manner towards this type of pressure.

4.5.2 Average Mean of Customer Pressure

This variable is denoted by X2 which is made up of the means of the responses as represented in Figure 4.5.

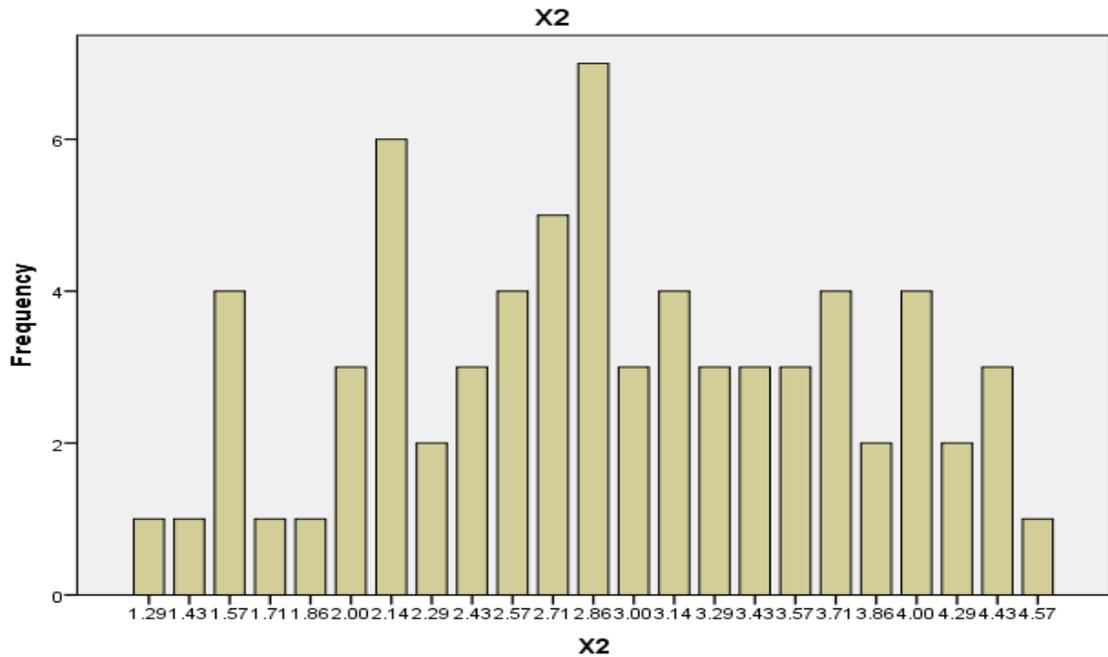


Figure 4. 4: Average Means of Customer Pressure

The highest mean frequency is 2.86 followed by 2.1 and 2.7. This variable appears inclined towards a mean that lies below midpoint of 2.5. The results show that few firms experienced minimal pressure from customers to perform certain activities in their favor. These results are consistent with the median results where some factors had a median of 2 signifying minimal effect.

4.5.3 Average Mean of Perceived Business Benefits

The average mean of perceived business benefits is denoted by variable X3 and the means of the responses obtained are represented in the Figure 4.5.

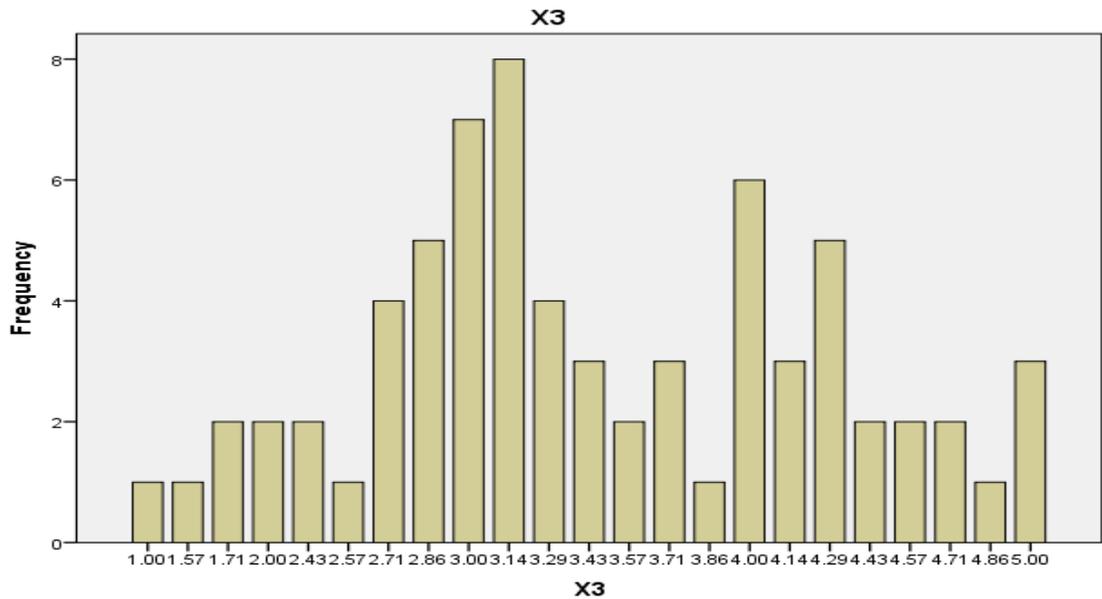


Figure 4. 5: Average Means of Perceived Business Benefits

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 the least score was 0.578 against a cut-off of 0.4

4.5.4 Average Mean of Corporate Social Responsibility

The average mean of corporate social responsibility is denoted by variable X4 and the mean of the responses are represented in Figure 4.6.

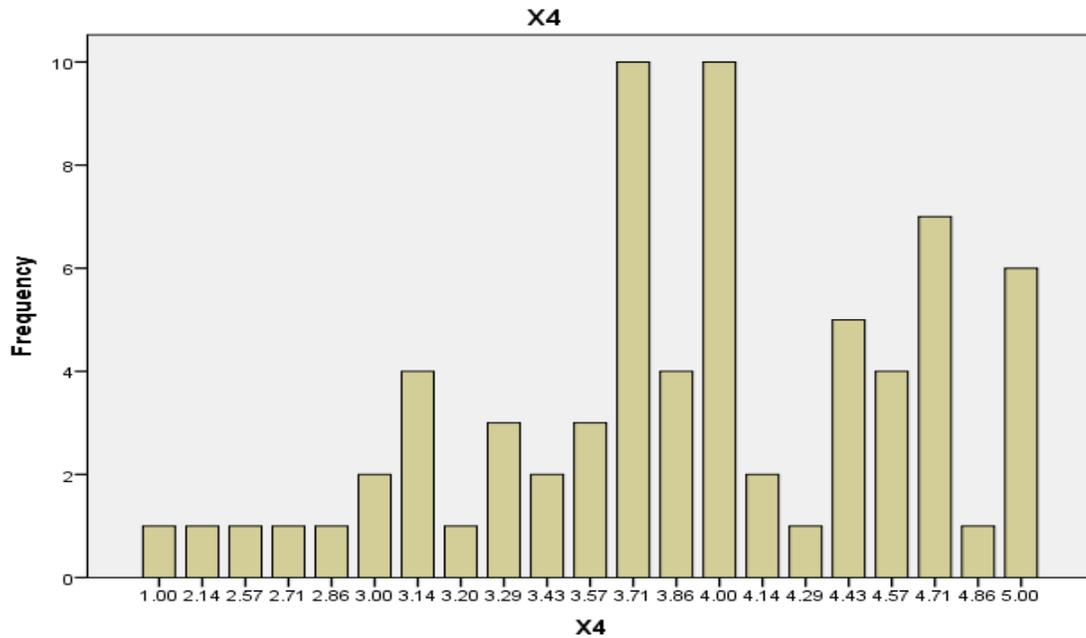


Figure 4. 6: Average Means of Corporate Social Responsibility

The results of this study as viewed from the mean frequencies show that the highest bars are those with a mean of 3.71 and 4.0 which are equal followed by 4.43 and 5. These results show that only about two firms had a mean frequency of less than 2.5. These results show that most firms in the industry have tended to respond the same way to this type of pressure.

4.5.5 Average Mean for Internal stakeholders

The average means for internal stakeholders are denoted by X5 and the relative mean frequencies are shown in Figure 4.7.

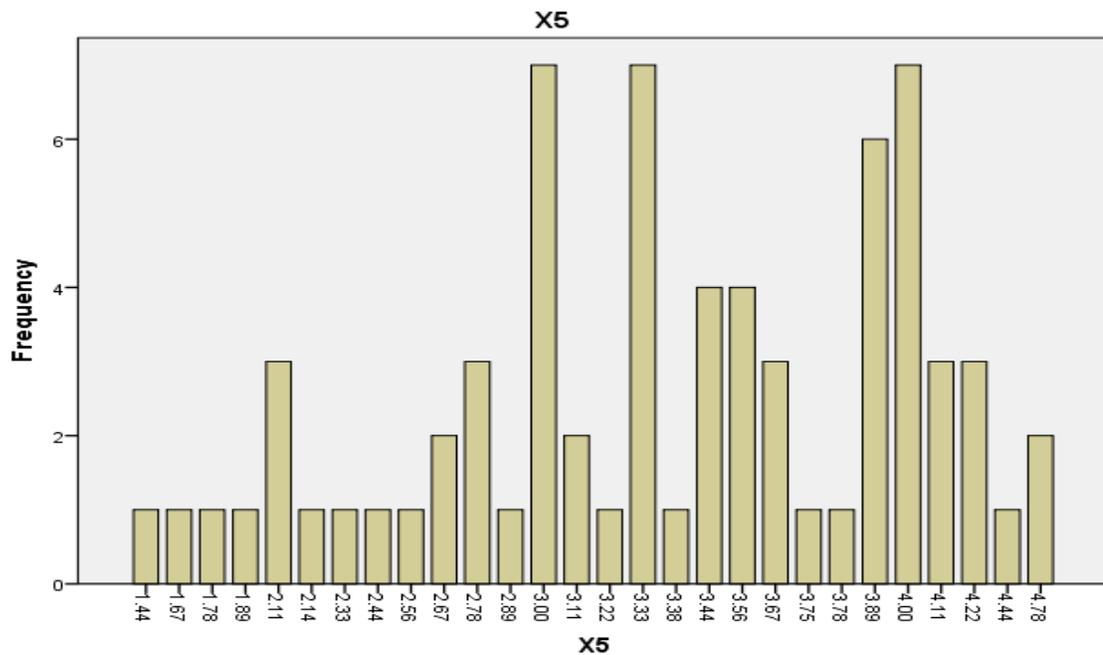


Figure 4. 7: Average means for Internal Stakeholders

The highest bar under this category is represented by mean of 4.00 followed by 3.33, 3.00 and 3.89. The results show that means of less than 2.5 had low frequency. These results show that there are certain factors that appear to be viewed the same way across board despite the heterogeneity of firms studied. These results are consistent with the median results where the median of 4 and 3 were observed for most responses.

4.6 Binary Logistic Regression Analysis

Spicer (2004) posits that for data where dependent variable is dichotomous and all independent variables are categorical or a mix or continuous but not normally

distributed, use of logistic regression is recommended. Logistic regression gives each predictor a coefficient which measures its independent contribution to variations in the dependent variable. Easterby-Smith *et al.* (2008) posit that $\log p/(1-p)$ model is the model used to assess the independent contribution of several predictor variables to the prediction of the odds.

The sample size for this study was 80 with a response of 70 and five independent variables which had a minimum of 10 cases. The decision rule applied in this study to determine into which group to classify a subject in case of the dependent variable was such that the target group is $p > .5$ and into the other group if $p < .5$. The seriousness of making one sort of an error would not be very severe since more weight was given to strategy adoption where very high and high were aggregated as the only two responses that contribute to a yes against the other three (1,2,3) for not adopting. The null hypothesis and the model fitting H_0 of our main interest states that there is no relationship between adopting/not adopting GSCS signifying the odds that firms adopted GSCS relative to not adopted. This is the situation where H_0 is such that B_1 equals zero. SPSS version 20 was used to compute various logistic regression outputs as follows:

- i. An overall evaluation of the model
- ii. Statistical tests of individual independent variables
- iii. Goodness-of-fit test statistics
- iv. An assessment of the predicted probabilities

4.6.1 Logistic Regression Output

The first statistical output of our study is that of cases used in the analysis as an initial step of assessing the model and the predictors. The classification table gives the base rates of the two decision options both in base rate and percentages as presented in the Table 4.15.

Table 4.15: Classification Table for Model Cases

Observed	Predicted			
	Y1		Percentage Correct	
	.00	1.00		
Y1	.00	0	34	.0
	1.00	0	36	100.0
Overall percentage				51.4

a. Constant is included in the model.

b. The cut value is .500

The results show that 70 cases were used in the analysis and given the base rates of the two decision options that is adopting versus not adopting green supply chain strategy. The results reveal that at least 51% fall under the category of those adopting. Thus for every case, the prediction that the subject will adopt, it is envisaged that we would be correct 51% percent of the time. These results compare well with the descriptive statistics hence no evidence of errors in case selection.

4.6.2 Logistic Regression Output for Dependent Variable Y1

The overall test of relationship among the independent variables and groups defined by the dependent is based on the reduction in the likelihood values for a model which does

not contain any independent variables and the model that contains independent variables.

The analysis for variables in the equation gives rise to the predicted odds of the study which is defined by those adopting versus those not adopting as illustrated in Table 4.16.

Table 4. 16: Logistic Regression Output for Adoption of GSCS

Variables in the Equation

	B	S.E.	Wald	df	Sig.	Exp(B)
Step 0 Constant	.057	.239	.057	1	.811	1.059

The results represent Block 0 where the model contains no independent variable which is termed as variables in the equation output. In this equation the intercept-only model $\ln(\text{odds}) = 0.057$ and the predicted odds $[\text{Exp}(B)] = 1.057$. This implies that the predicted (odds) of a firm deciding to adopt green supply chain strategy is 1.057. The significance level is 0.811

4.6.3 Logistic Regression Output for Independent Variables

Table 4. 17: Variables not in the Equation

	Variables	Score	df	Sig.
	X1	6.328	1	.012
	X2	7.754	1	.005
Step 0	X3	26.208	1	.000
	X4	17.180	1	.000
	X5	28.512	1	.000
	Overall Statistics	32.619	5	.000

The variables not in the equation table review that all the independent variables improve the model since they are all significant at $p < 0.05$, hence they have all contributed to the predictive power of our model.

Overall Relationship between Dependent and Independent Variables

The presence of a relationship between the dependent variable and combination of independent variables is based on the statistical significance of the model chi-square at step 1 after the independent variables have been added to the analysis.

Table 4.18: Model Chi-square

	Chi-square	df	Sig.	
Step	46.887	5	.000	
Step 1	Block	46.887	5	.000
	Model	46.887	5	.000

Block 1 where the independent variables were entered giving rise to $-2\log$ measures the standard error associated with trying to predict the independent variables. The difference between the two gives rise to the chi-square. The model chi-square was used to test the overall significance as derived from the likelihood of observing the actual data under the assumption that the model fits accurately. This assumption gives rise to the premise for testing the hypothesis relating to the overall fit of the model as follows:

H_0 : The model is a good fitting model

H_1 : The model is not a good fitting model

In this analysis, the probability of the model chi-square (46.887) was 0.000, less than or equal to the level of significance of 0.05. The null hypothesis that there is no difference between the model with only a constant and the model with independent variables was rejected. The existence of a relationship between the independent variables and the dependent variable was supported.

4.6.4 Hosmer and Lemeshow Test

Logistic regression uses the test as an alternative to chi-square for test of model significance. The model is deemed to have a good fit when the results are non-significant. The results are as indicated in Table 4.19

Table 4.19: Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	6.310	8	.613

The Hosmer & Lemeshow test is an alternative to chi-square model used in logistic regression for testing the goodness of fit for the model. In this case a well fitting model is one where the test statistic is greater than 0.05, the case where we fail to reject the null hypothesis that there is no difference between observed and model predicted values. The results of this analysis show non-significance at a computed value of 0.613 hence greater than 0.05. The Hosmer & Lemeshow (1997) statistic results serve to confirm further that the two tests where chi-square test has significance of 0.00 yield similar outcomes with Hosmer & Lemeshow test results with a significance of 0.613 hence not statistically significant being construed to mean goodness of fit. From the two results we fail to reject the null hypothesis H_0 : The model is a good fitting model and conclude that our research model has a good fit.

Test of Strength of Relationship

The logistic regression results given by the model summary represent the test of the strength of the relationship between the independent and dependent variables in this study.

Table 4.20: Model Case Summary of Relationship of Variables

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	50.096 ^a	.488	.651

a. Estimation terminated at iteration number 7 because parameter estimates changed by less than .001.

Table 4.20 presents the outcome of the difference between -2log likelihood of the best-fitting model and the -2log likelihood for the null hypothesis model with degrees of freedom of five which is equal to the five independent variables. This analysis yields a -log likelihood value of 50.096 with a chi-square value of 46.887. The Cox & Snell is 0.488 and 0.651 for Nagelkerke. These results explain at least 65 percent of the factors identified in this study as having an influence on the dependent variable. Variance is explained by R^2 as calculated using Cox & Snell which is 48.8% and Nagelkerke which is 65%. Going by the larger one the results indicate a fairly strong relationship of approximately 65% between the predictors and the prediction.

4.6.5 Test of Logistic Regression Model Usefulness

Table 4.21: Classification Table with Both Variables

		Observed		Predicted		Percentage Correct
				Y1	1.00	
Step 1	Y1	.00	29	5		85.3
		1.00	5	31		86.1
	Overall percentage					85.7

a. The cut value is .500

This step of analysis was used to ascertain whether there was any improvement of the predictive power of the model in respect to the previous stage. The results reveal that

there was remarkable improvement. Thus, the sensitivity and specificity of our study as observed from the classification Table 4.21 for prediction of adoption of green supply chain strategy reveals that the model was able to correctly classify 85.3% of those firms predicted as adopting green supply chain strategy and 86.1 of those who did not respond positively to adoption of green supply chain strategy, for an overall success rate of 85.7%.

The Relationship of Individual Independent Variable with the Dependent Variable

The method of logistic regression applied in this study was simultaneous entering of all the independent variables. This gives rise to the table of results for variables in the equation which contains the coefficients, standard errors, Wald statistic, significance level and exponential beta coefficients for each independent variable as represented in Table 4.22.

Table 4. 22: Variables in the Equation

Variables	B	S.E.	Wald	Df	Sig.	Exp(B)
X1	-.381	.672	.321	1	.571	.683
X2	.276	.688	.161	1	.688	1.318
X3	1.561	.779	4.009	1	.045	4.762
X4	1.138	.743	2.348	1	.125	3.121
X5	2.241	.972	5.312	1	.021	9.402
Constant	-17.057	4.502	14.353	1	.000	.000

a. Variable(s) entered on step 1: X1, X2, X3, X4, and X5.

Independent Variables in the Equation

The Wald test is used to determine statistical significance of each individual independent variable and the relationship of each with the dependent variable. This helps in eliminating any overlap between predictors. In this study not all independent variables met the conventional 0.05 standard for statistical significance as observed in the Table 4.22. This provided evidence to reject the null hypothesis and conclude that the model estimates fit the data set at an acceptable level. Individual coefficients represent change in probability of being a member of the modeled category irrespective of the value of the other variables.

Multicollinearity in the logistic regression solution is detected by examining the standard errors for the b coefficients. A standard error larger than 2.0 indicates numerical problems among the independent variables. The results of our study indicate that the standard errors of all the independent variables are less than 2.0 and the unit change in the dependent variable increases the odds of modeled events of all the independent variables by less than 10 times. All this show that there is no problem of multicollinearity and that the model is appropriate for interpretation of the results.

4.6.6 Results of Odds Ratios

The odds ratio is a measure of effect size. In our study the relationship of regulatory pressure (X_1) to the dependent variable (adoption of GSCS) had a value of $\text{Exp}(B)$ of 0.683 which implies that a one unit increase in pressure to adopt GSCS decreased the odds that survey respondents were least affected by regulatory pressure but to a very minimal extent. The results show that the variable has an un-standardized coefficient of -0.381 with a non-significant outcome of 0.571 where $p\text{-value} \leq 0.05$.

The odds for customer pressure (X_2) driver is 1.32 and with one point increase in the scale for measuring respondents influence to adopt GSCS, the likelihood of adoption increases by a multiplicative factor of 1.32 with a beta coefficient of 0.278 which has

very minimal impact. This variable is not significant since it has a computed p-value of 0.688 where $p \leq 0.05$.

The odds ratios for perceived business benefits (X3) driver is 4.8 which means that one point increase in the scale for measuring respondents influence of perceived benefits to adopt GSCS increases odds of adoption by a multiplicative factor of 4.8 and a beta coefficient of 1.56. The results reveal this as one of the variables with high probability and statistically significant at 0.045 where p-value is $p \leq 0.05$.

The odds ratio for Corporate Social Responsibility (X4) driver is 3.12 and with one point increase in the scale for measuring respondents influence to adopt GSCS. The likelihood of adoption increases by a multiplicative factor of 3.12 and beta coefficient of 1.14. This is high but nevertheless insignificant at 0.125 where $p \leq 0.05$.

The odds ratios for Internal Stakeholders (X5) is 9.4 which means that one point increase in the scale for measuring respondents' influence of Internal Stakeholders to adopt green supply chain strategy increases odds of adoption by a multiplicative factor of 9.4. The beta coefficient is 2.24 and the results reveal that there was remarkable increase of the odds that survey respondents were highly influenced to adopt green supply chain strategy. The variable was statistically significant at 0.021, where $p \leq 0.05$.

The analysis of the data collected as presented on Table 4.22 gives rise to our logistic regression model equation as follows;

$$\ln Y_1 = -17.1 - 0.38X_1 + 0.28X_2 + 1.56X_3 + 1.14X_4 + 2.24X_5,$$

Interpretation of the logistic regression equation

Logistic regression uses maximum likelihood method which maximizes the probability of getting the observed results given the fitted regression coefficients. The outcome is hence interpreted as follows:

$\ln Y_1$ = result of our prediction based on knowledge of the five independent variables that the probability for adoption of green supply chain strategy falls in category (1) and not category (0) which is for not adopting. The slope represents the change in average value of Y from one unit change in X, which are equal to the changes of the log odds of the dependent variable. The constant is -17 which does not have a significant impact.

The 'b' coefficients for each of the independent variables X_1 X_5 denote the various log odds which are indicative of the slope values. From the equation, variable X_1 which represents regulatory pressure has a negative value hence less than one. This means that an increase of this predictor leads to a drop in the odds of adoption of GSCS occurring. The 'b' coefficient for X_2 which represents customer pressure is 0.28 hence it does not increase the odds of adoption. X_3 , X_4 and X_5 which represent perceived business benefits, CSR and internal stakeholder pressures respectively, have positive 'b' coefficients which are above one and therefore an increase in either of these predictors can lead to an increase of the odds of outcome of adoption of GSCS occurring.

The model equation shows that the signs in our logistic regression model are not all positive but they are logs where the sign indicates the direction of the influence except for the constant . The model provides knowledge of the relationships and strengths among the variables which are based on the results of the model predictions of the dependent variable based on the contributions of all the independent variables. The partial regression coefficients give the independent effect of a driver on adoption of green supply chain strategy, while the other independent variables are held constant. The results of this analysis show that pressure exerted on firms viewed as perceived business benefits and pressure emanating from Internal Stakeholders seem to drive adoption of GSCS by manufacturing firms by high multiples as evidenced by the significant positive and high regression coefficients $\exp(b) = 4.8, 9.4, p < 0.05$.

4.6.7 Hypotheses Testing Results

The results of this study as depicted in Table 4.22 were used to decide whether to accept or reject the study hypotheses.

H₀₁: Regulatory pressure does not contribute to adoption of green supply chain strategy by manufacturing firms in Kenya.

Regulatory Pressure (X₁) has a significance value of 0.571 which is higher than p value < 0.05. The results of this study indicate that calculated p-value is higher than 0.5 therefore we do not have enough evidence to reject the null hypothesis. This variable does not appear to influence firms desire to adopt green supply chain strategy.

H₀₂: Customer pressure does not contribute to adoption of green supply chain strategy by manufacturing firms in Kenya.

The model diagnostic suggest that Customer pressure does not contribute to adoption of GSCS since p-value is higher than 0.5 hence no sufficient evidence to reject the null hypothesis.

H₀₃ : Perceived business benefits do not contribute to adoption of green supply chain strategy by manufacturing firms.

Perceived business benefits has a calculated p-value of 0.045 and exp(β) of 4.8. According to these survey results, there is substantial evidence to reject the null hypothesis and conclude that perceived business benefits contribute to adoption of green supply chain strategy by manufacturing firms in Kenya. This variable appears to have high influence in the region of 5 times for every unit change of the odds. This outcome is consistent with the descriptive statistics where about 50 out of the respondents responded to the open ended question seeking to establish whether there are firms that have recorded some growth since adoption of green supply chain strategy. The factor loadings and above the threshold of 0.4.

H₀₄: Corporate Social Responsibility does not contribute to adoption of green supply chain strategy by manufacturing firms.

According to these survey results, we fail to reject the null hypothesis and conclude that Corporate Social Responsibility does not contribute to adoption of green supply chain strategy by manufacturing firms in Kenya. This is not significant since p-value is 0.125 and therefore statistically insignificant. This variable appears to have some influence in the region of 3 times for every unit change of the odds though insignificant.

H₀₅: Internal stakeholders do not contribute to adoption of green supply chain strategy by manufacturing firms.

Internal stakeholders has a calculated p-value of 0.021 and $\text{Exp}(\beta)$ of 9.4. According to these survey results, there is substantial evidence to reject the null hypothesis and conclude that Internal Stakeholders contribute to adoption of green supply chain strategy by manufacturing firms in Kenya. This variable appears to have the greatest influence in the region of almost 9.5 times for every unit change of the odds.

4.7 Discussions of Findings

The results of this study generally agree to some extent with recent studies citing developing countries including Kenya envisioning a growing trend in responsiveness by firms towards adoption of green supply chain management practices (Katua, 2012; Okello & Were, 2014; Solomon, *et al.*, 2014). This study point out to the findings which relate to the five research hypotheses postulated in line with the objectives. The findings answer the research question in a number of ways as follows in the discussions provided.

Regulatory pressure does not contribute significantly to adoption of green supply chain strategy by manufacturing firms in Kenya.

The descriptive results of this study reveal that most of the firms targeted in this study were large employing more than 100 employees with a turnover of more than Kenya shillings 100 million. The size of a firm and the nature of its processes has a consequence to the environment and supply network and hence the environmental policy. It was postulated that large manufacturing firms impact the environment through their processes and that governments' in bid to overcome and prevent environmental degradation, stringent regulatory aspects are necessary. These results do not rule out the presence of smaller manufacturing firms hence an indication that not only large manufacturing firms are registered by KAM. The umbrella body for manufacturing firms in Kenya (KAM) offers energy awards for innovative energy saving and renewable energy techniques, and has partnered with NEMA to sensitize members on the need to comply with set environmental government policies.

The results of this study as per Table 4.2 show median results which are as low as 2 and 3 having the highest frequency. Frequencies of means as per Figure 4.3 are highest at 2.5 followed by 2.88. These preliminary results portray that regulatory pressures are not so important in influencing manufacturing firms' decision to adopt green supply chain strategy. Views sought from respondents in relation to presence of other techniques for responding to green drivers manifested through regulatory pressures did not yield much. Hitchcock (2012) argues that in addressing climate change challenges, the focus is shifting from legislative frameworks that focus narrowly on energy-intensive industries and large less energy intensive users to include consumption by small businesses and organizations. Seksan *et al.* (2010) found positive relation of regulatory pressure on adoption of green supply chain strategy by electronic firms in Thailand. The sample population for this study includes the Electrical and Electronics sector though it will be noted that Kenya imports electronic products heavily. Zailani *et al.* (2010) noted that

even in countries like Malaysia which do not have green policy experienced pressure from those of other countries demanding compliance. However, it can be noted that unlike the developed countries manufacturing firms in Kenya suffer from cheap imports and exports of raw materials like the case of battery manufacturers. Additionally, Kenya has challenges of weak and fragmented policy coordination among relevant ministries and compliance and enforcement. Secondly, it lacks a tool for systematic monitoring of industrial effluent and emissions (UNEP, 2015). Hitchcock (2012) argues that supply-chain pressures are driven by regulatory developments relating to specifications for products to be placed on the market and reverse logistics decisions.

The results of this variable reveal that of the green practices assessed, only the attribute - use of green criteria in technical specifications of contracts had the least rating at 37.7 percent for combined very high and high. Conversely, the pressure to comply in order to secure tenders in respect of the independent variable regulatory pressure was low at 40 percent. Hitchcock (2012) envisages that policy pressures through public procurement were significant in large economies like United Kingdom (UK) where this was reflected through contractual provisions for supply to public authorities and in the tendering procedures. The results of this study are consistent with the current state of Kenya as it gears towards a green economy. Further, regulatory pressure had an overall median of 3 an indication of weak legal regime to the advantage of the firms. These results are consistent with some previous studies which showed that success stories of pollution control in many developing countries cannot be attributed to the adequacy and efficiency of existing legal norms and enforcement practice (Kamau, 2011). According to GOK (2015) report on Kenya Green Economy Strategy and implementation Plan (GESIP) there were gaps of fiscal policy nature to be leveraged upon. They include, public procurement environmental taxes, pollution, subsidies, public expenditure on green infrastructure and feed-in-tariffs.

The test of hypothesis on the variable regulatory pressure indicate that it was non-significant and that the beta coefficient was -0.381 an indication that the effect of

regulatory pressure had an indirect impact but to negligible extent since $\text{Exp}(\beta)$ was less than one. This can be attributed to the high standard firms have set for themselves and support by the umbrella body which may be way above the government requirement or a situation indicative of complacency with the current regulations. According to NEMA (2015), there are a multiplicity of regulators which make it difficult to isolate regulatory pressure specific to green issues. Both the descriptive results and hypothesis testing results lead to the same conclusion that regulatory pressure does not contribute to adoption of green supply chain strategy by manufacturing firms in Kenya. The assessment of whether this variable improves the model shows that it was significant at 0.012 as observed in table 4.16 for variables not in the equation a factor that helps explain the presence of this and other unaccounted variables influencing adoption of GSCS though to a minimal extent.

Regulatory instruments in South Africa include mandatory take-back, minimum recycled content, disposal bans, restricted material and product bans and the polluter pays policy (DANIDA Report, 2005). This study reveals that Kenyan manufacturing firms do not view these threats as strong motivators of adoption of GSCS. Laosirihongthong, Adebanjo, Tan and Choon (2013) used institutional theory to study whether institutional norms in emerging economy countries where manufacturing has been outsourced differ from results of previous studies conducted in developed countries. Their study confirmed that there were significant variations, a notion that can help explain why the outcome of regulatory pressure in the case of Kenya differed strongly from literature obtained from countries like China, UK, South Africa and Malaysia.

Delmas *et al.* (2003) noted that distinct levels of coercive pressure are exerted upon different industries, which would ultimately result in different environmental strategies as has been noted. Some studies have revealed instances where external and internal pressures have no influence on implementation of GSC practices because of government's choice of the category of firms to regulate. Chang, Kenzhekhanuly and

Park (2013) found this to be the case in Korea where pressure felt by small-sized firms was far less compared to large sized which the government targeted with the regulation. We infer that regulatory pressure resulting from the need to green is influenced by several factors including the stage of development a nation is, the products they manufacture and government role in policy formulation, compliance and enforcement.

Customer pressure does not contribute significantly to adoption of green supply chain strategy by manufacturing firms in Kenya.

The descriptive statistics for this study variable revealed that customer pressure had minimal influence on adoption of green supply chain strategy. Results obtained as per Table 4.3 show that none of the factors assessed had an average median of more than 3. Factors such as loss of customers whose demand for green products was not met, pressure from suppliers or even NGOs was not felt as observed from Likert scale results of 5 for very high influence which were equal to 2.9%, 5.7 % and 8% respectively.

According to Youn, Yang and Roh (2012) Fisher's Seminal Work concept was used to infer the distinction between an eco-efficient supply chain versus an eco-responsive supply chain where the former focuses on keeping to an environmental standard across the supply chains centering on collaboration of suppliers and distributors in greening the supply chain. In the latter, firms focus on initiatives to educate and encourage consumers to engage in recycling activities. Our study reveals low take up of reverse logistic practices on the adoption side and minimal pressure from suppliers and distributors in relation to green issues. These results viewed in light of the results of the variable regulatory pressure show that suppliers have an easy time and consumers may be lacking the technical knowhow and such other factors that give the manufacturer an upper hand. UNEP (2015) revealed lack of awareness among many farmers which makes it problematic to significantly address issues in the agricultural sector in Kenya which forms the bulk of raw material for the food processing industries.

The test of hypothesis for this variable was non-significance and the null hypothesis which stated that H02: Customer pressure does not contribute to adoption of green supply chain strategy by manufacturing firms in Kenya was accepted. We infer that of awareness of the impact of green issues and how to respond with a green supply chain strategy is a challenge both to the firms and customers.

Perceived business benefits contribute significantly to adoption of green supply chain strategy by manufacturing firms in Kenya.

The descriptive results of the analysis of this variable observed as depicted in Table 4.4 and Figure 4.5 revealed that a large number of respondents agree with the notion that perceived business benefits is the reason they considered green approaches. Competitive advantage was top at 41.4% on very high influence on 5 point-Likert scale measure, followed by improved customer-supplier relations at 38.8%. The pattern portrayed by the bars on mean frequencies is consistent with the median results. 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 H₀₃: Perceived business benefits do not contribute to 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 5 times against not adopting. This variable contributed to the model fit where the significance level for variables not in the equation as per table 4.16 was p-value equal to 0.00. The Hosmer and Lemeshow (1997) test results likewise were non-significant at p-value of 0.613 as found in Table 4.20 a situation when a logistic regression has good fit.

Hajikhani *et al.* (2012) posit that it is well-known that making revenue and financial profits are the most significant objective of any organizations. This 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 green supply chain 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 percent to this factor in respect of its influence on adoption coupled with green supply chain 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. Dangelmaier, Blecken, Delius and Klipfer (2010) argue that pressure to focus on sustainability of supply chains is key for global market products, whereas manufacturing focus in relation to sustainable development focuses on resource efficiency, and a focus on higher degree of social and ecological control can yield financial benefits. Gakure, Keraro, Okari and Kiambati (2012) posit that “Green rules drive innovation in firms” with the notion that: poorly formulated or executed environmental policies and strategies can diminish the competitiveness of companies and a whole industry.

Chien *et al.* (2007) identified both external and internal factors/drivers that contributed to adoption of green supply strategies. They include; environmental regulation, external stakeholders, environmental performance (internal) and financial performance (internal). These findings are consistent with the results of this study, the value chain theory and our proposition in respect of perceived business benefits. Cumulative percentages of the four factors with a median of 4 are for very high and high influence 68.6, 52.9, 78.5 and 67.2 percent. Yenming *et al.* (2015) obtained evidence suggesting that engaging customers in green relationships results in high levels of green product strategy, which is

used as a response to competitive challenges. The results of this study follow a similar trend.

Corporate Social Responsibility does not contribute significantly to adoption of green supply chain strategy by manufacturing firms in Kenya.

The descriptive statistic results of this study indicate that responses were positively skewed with a median of 4 for all factors considered. Results of Table 4.5 show that about 80 percent admit that Corporate Social Responsibility was the major reason they adopted green supply chain strategy. The activity prevalent was tree planting and a few philanthropic activities which were not necessarily environmental friendly related. Solomon, Mohamad and Jamaluddin (2014) envisage that lack of information sharing and cost can prevent adoption of innovative GSCM practices. These results support the notion that not all CSR activities translate to green initiatives or are driven by green issues. In terms of innovativeness, firms in Kenya may be construed to be lagging behind and that the available options are easy to replicate.

The results of the logistic regression analysis reveal that the variable contributed to the model fit as its significance in the variables not in the equation was p-value equal 0.00. However, the results for significance test in respect of hypothesis testing revealed that CSR was not significant and hence not appropriate for prediction of the results, but the results were nevertheless important for explaining the likely reasons for such outcomes. The odds ratio was 3.1 an indicator that for one unit increase of a factor of CSR there would be likelihood of adoption by a factor of 3 which is quite reasonable. EITayeb *et al.* (2009) encountered a similar situation where the descriptive results showed high level of social responsibility but retaliates that similar sense of the social responsibility did not seem to induce the Malaysian firms to adopt green purchasing practices.

Uwalomwa *et al.* (2012) found that manufacturing firms in Nigeria focused more on CSR environmental disclosures relating to good news rather than bad or neutral news. Additional findings reviewed that these firms were more interested in reporting

monetary disclosures of CSR issues and not outright declarative of environmental disclosure statement. These findings shed light to the nature of outcomes observed in our study where CSR was found to be an easy thing to do but the activities were found to have minimal bearing on green issues and they were not easily quantifiable.

Internal Stakeholders contribute significantly to adoption of green supply chain strategy by manufacturing firms in Kenya.

The descriptive statistics show that internal stakeholders had a role to play in decisions for strategy related to green issues facing an organization and its environment in general. Priority of CEO and/or Board of Directors, high cost of production inputs and high energy costs were major factors scored at very highly and high at over 60 percent as observed in Table 4.6. However, the factor on employee level of awareness of environmental issues had the lowest influence at 8.7 percent of very high influence. Increased green awareness training and campaigns for green practice were not highly practiced. Additionally, the results revealed lack of involvement of employee by management as one of the factors that hindered adoption of green strategy. These results are consistent with similar studies in the area of influence of stakeholders on adoption of environmental strategy or green supply chain strategy to some extent. Chien (2014) noted that some studies which aimed at assessing stakeholder pressures as determinants of CSR strategic choice, found evidence about firms joining self-regulatory codes due to stakeholder pressure. Linblom and Ohlsson (2011) found that for the Swedish energy manufactures, environmental strategy was influenced highly by top management, shareholders and employees.

Holt and Ghobadian (2009) argue that this generation and generations to come must have a compelling and ever more urgent duty of stewardship to take care of the natural environment and resources on which our economic activity and social fabric depends. This proposition seems to hold as reviewed by our study where internal stakeholder driver was found to be the most influential. Xie and Breen (2012) found that in greening

a pharmaceutical supply chain in UK, a strategy that aims at preventing pharmaceutical waste and effective disposal calls for every producer to be duty bound. Pharmaceutical firms were included in this study and based on the positive outcome of the internal stakeholders influence on firms, it can be argued that Kenyan firms also feel duty bound to facilitate safe handling of waste emanating from their processes. Hajikhani, Wahiza and Idris (2012) found in a similar study that internal strategic motivations were the most significant predictors of adoption of GSCM practices just as has been revealed by our study. It can be argued that the outcome of these results are in support of these propositions and the stakeholder theory which focuses heavily on top management as key drivers of the process is significantly supported.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the main conclusions and recommendations of the study. The conclusions are drawn from the data analyzed in chapter four and the findings thereof, while recommendations for action and direction for future research have been based on the conclusions made. These conclusions and the recommendations presented are categorized based on the objectives of the study which sought to examine the effect of green issues (drivers) on adoption of green supply chain strategy by manufacturing firms in Kenya.

5.2 Summary of Findings

The study was designed to investigate the extent to which pressure emanating from the five drivers (regulatory pressure, customer pressure, perceived business benefits, CSR and internal stakeholders) in relation to demand for eco-solutions influenced manufacturing firms' strategic choice in favour of green supply chain strategy. This study has drawn several conclusions all of which bear on the influence of green issues on adoption of green supply chain strategy by manufacturing firms in Kenya.

In summary, the study concluded that:

1. This study found that all the tests performed on the appropriateness of the logistic regression model based on the assumption of a dichotomous dependent variable yield positive results.
2. Manufacturing firms in Kenya have adopted green supply chain strategy as a result of inherent green issues (drivers).

3. That internal stakeholder driver and perceived business benefits contributed most significantly to adoption of the strategy
4. The most significant aspect of the strategy was green manufacturing practices and reverse logistics
5. Certain factors predominantly investment costs and lack of awareness tended to hinder adoption.

The study went ahead to identify specific elements of each driver that influenced the choice in favor of adoption of the strategy. These are summarized below along the study's variable categories.

5.2.1 To establish the contribution of regulatory pressure on adoption of green supply chain strategy by manufacturing firms in Kenya.

From the results of the logistic regression analysis between regulatory pressure and adoption of green supply chain strategy, there was not enough evidence to reject the null hypothesis that H_{01} : Regulatory pressure does not contribute significantly to adoption of green supply chain strategy by manufacturing firms in Kenya. The study found that firms had more stringent controls than those imposed by the government. According to NEMA (2015) report, the authority has been faced with compliance challenge due to multiplicity of regulators, low levels of awareness and backlash from the public due to improperly done Environmental Impact Assessment (EIA) reports. Mutingi (2013) posit that in a coercive supply chain environment with minimal inter-organizational engagement and functional product/process, compliance centred strategies are adopted where concerned industry merely focuses on satisfying stakeholder regulatory requirements. This claim was supported by the results of this study where compliance in respect of annual environmental audits seemed to be their main concern.

Though the Public Procurement and Disposal Act 2005 of Kenya makes reference to the need to have environmental considerations in procurement of goods and services, there

are no guidelines on how to implement this. This study found that pressure to comply in order to secure tenders was not a major concern. The study also found that the international laws did not seem to influence Kenyan firms decision to adopt the strategy. Krell *et al.* (2009) envisage that regulatory pressure occurs when governmental agencies directly or indirectly force firms to change their strategy. From this study results it is evident that enforcement aspect of regulatory pressure was not sufficient to cause significant change in favour of adoption of green supply chain strategy by manufacturing firms in Kenya.

5.2.2 To examine the contribution of customer pressure on the adoption of green supply chain strategy by manufacturing firms in Kenya.

The results speak to the extent by which consumer awareness, business, households and suppliers influence the strategy taken up by firms in light of green issues. The descriptive results were indicative of weak support. The results of the logistic regression however showed that the variable contributed to the model equation with a significance of 0.00 despite being insignificant upon testing the hypothesis. Community stakeholders influence green decisions especially where health impacts and sustainable solutions can be identified with confidence (Kearney, 2004). There does not seem to be any literature in Kenya showing evidence of the direct impact of green issues on health. In this study not even the employees seemed to be bothered by environmental conditions in their organizations. An assessment of employee level of awareness of environmental issues was found to have the least influence at 8.7 percent as having very high influence.

Loss of customers whose demand for greener products is not met was a factor that received very low rating of a median of 2. The results also reveal that pressure from green movements and financing institutions was minimal. These results contrast the empirical results of the survey by Boston Consulting Group which revealed that 73 percent of customers in developed countries were paying a premium for green products (Jun et al., 2010). The results of the green marketing practices show that firms were not

doing much. This study confirms the proposition that the fundamentals that influence firms to adopt green supply chain strategy in developed countries may be different from those in developing countries and the strategy may also differ despite having similar objectives. According to Zailani (2010) customer pressure was found to be a very strong driver of adoption of GSCS in developed countries.

5.2.3 To determine the contribution of Perceived Business Benefits on adoption of green supply chain strategy by manufacturing firms in Kenya.

Perceived Business Benefits fall under the category of mimetic pressure and in this study it was manifested as one of the main drivers of adoption of green supply chain strategy by manufacturing firms in Kenya. The study found that firms have a high desire for practices that have economic returns or those that are viewed as having an impact on cost of operations and competitive advantage. Oral (2009) cites that one of the reason why firms adopt environmental related strategies is for their survival. The empirical evidence derived from the descriptive results and significance test of hypothesis support this argument. Pan Paper mills, Eveready battery manufacturers are examples of firms that have had survival challenges emanating from environmental issues. Kengen and Geothermal Development Corporation benefit from carbon credits in addition to production of green energy in Kenya. The energy sector was included in this study and earning of carbon credits was evident.

5.2.4 To assess the contribution of Corporate Social Responsibility on adoption of green supply chain strategy by manufacturing firms in Kenya.

From the results of the logistic regression analysis between CSR and adoption of green supply chain strategy, there was not enough evidence to reject the null hypothesis that H_{01} : Corporate social responsibility does not contribute significantly to adoption of green supply chain strategy by manufacturing firms in Kenya. The results of this study revealed a situation which makes CSR a household name synonymous to adoption of a

green strategy characterized by planting of trees a legacy left behind by the (late Laureate winner Professor Wangari Mathai), in addition to other easy to adopt practices such as supporting needy persons in the society. It was envisaged that through the open ended questions firms would bring out a myriad of CSR activities they perform but the study found that almost all respondents had similar views and activities, a situation supported by the descriptive results where all the median result was 4 for all questions. Dimaggio *et al.* (1983) argues that institutional theory is traditionally concerned with how groups and organizations better secure the positions and legitimacy by conforming to the rules where legitimacy refers to the adoption of certain practices which are seen by stakeholders as being proper and appropriate.

5.2.5 To examine the Internal Stakeholder pressure on the adoption of green supply chain strategy by manufacturing firms in Kenya.

Internal stakeholder pressure was found to be the most important driver of adoption of green supply chain strategy. The test of the relationship between internal stakeholders and adoption of the strategy showed that there was enough evidence to reject the null hypothesis that H_{05} : Internal stakeholders do not contribute significantly to adoption of green supply chain strategy by manufacturing firms in Kenya. The odds ratio for the variable was 9.4 which translates to the remarkable impact internal stakeholders have in case of Kenya. The empirical evidence on top management displayed overwhelming positive results with the Chief Executive Officer topping the list. The level of employee awareness, low employee morale due to environmental related issues were low despite employee being a key internal stakeholder. In assessing factors that hinder adoption of green supply chain strategy, lack of awareness emerged as a key issue. This study variable was found significant with results which closely match the assumptions of the institutional theory and by extension the literature reviewed in respect of internal stakeholders in this study (Delmas, 2009).

5.3 Conclusions

The general conclusion arising from this study is that adoption of green supply chain strategy by manufacturing firms is not just a buzzword but an emerging research area. From the study conclusions relating to specific objective have been drawn. These are summarized below along the study variable category.

5.3.1 To establish the contribution of regulatory pressure on adoption of green supply chain strategy by manufacturing firms in Kenya.

Based on the results of the study, it can be deduced that regulatory pressure does not contribute significantly to adoption of green supply chain strategy in Kenya. The empirical findings largely indicate that regulatory pressures need to go beyond compliance. The firms have created their internal controls to counter the pressure from the government and even internationally. The study concludes that since firms were ready to comply and also to improve their responsiveness towards greening their supply chains, the government can leverage on this by giving incentives or attractive fiscal environmental policies and also through enforcement. The study concludes that for the firms to adopt green strategies in relation to regulatory pressure, they would first exhaust their internal mechanisms, and in the absence of this, the response is a reactive green strategy characteristic of simply compliance (Mutungi, 2013).

5.3.2 To examine the contribution of customer pressure on the adoption of green supply chain strategy by manufacturing firms in Kenya.

This study concludes that customer pressure does not significantly influence adoption of green supply chain strategy. The results reveal that suppliers have an easy time with manufacturers and that consumers lack technical knowhow. Thus, both the customer and producer lack awareness and technical knowhow as has been inferred from this study.

5.3.3 To examine the contribution of customer pressure on the adoption of green supply chain strategy by manufacturing firms in Kenya.

This study concludes that perceived business benefits play a critical role in response to green issues affecting a firm's efficiency and profitability. Gains from energy saving, utilization and carbon credits are some of the areas the firms were targeting. This study draws the conclusion that competitive advantage is an important ingredient of strategy development and implementation.

5.3.4 To assess the contribution of Corporate Social Responsibility on adoption of green supply chain strategy by manufacturing firms in Kenya.

The study concludes that CSR does not play a significant role in decisions relating to what firms should do as a matter of moral obligation to the society in relation to the environment. The manufacturing firms studied were different in type and size, yet the prevalent CSR activity was tree planting. From the results of the study and from a strategic view point CSR in Kenya is a common practice hence no comparative advantage. Mutingi (2013) argues that firms considering introduction of green strategies in their supply chain commonly adopt compliance based strategies merely to respond to environmental regulations, stakeholders and customer pressure.

5.3.5 To examine the Internal Stakeholder pressure on the adoption of green supply chain strategy by manufacturing firms in Kenya.

This study concludes internal stakeholders drive adoption of green supply chain strategy by manufacturing firms in Kenya. There were three outstanding contributing factors including top management, operational cost reduction and image. This conclusion ties with the notion that firms adopt business strategies for survival and that top management drives strategy adoption. Hence the conclusion that top managers in Kenya's manufacturing firms are keen green issues affecting their business survival. Further the study concludes that the employees in these manufacturing firms do not play a major

role in decisions relating to their internal environment as evidenced by these findings. They lack awareness.

5.4 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. On regulatory pressure, the government may consider review of the current regulatory framework to make it more enforceable and also to broaden the scope to include demands for higher environmental standards in tendering which deals with the origin of need in supply chain. The manufacturing firms can also lobby the government for favourable fiscal policy and dissemination of green economy and data.

Customer pressure was identified as an ineffective driver in relation to adoption of GSCS. Thus, the recommendation that agencies advocating for consumer rights should endeavor to do more advocacy and sensitization of consumers. The government should ensure that firms have mandatory environmental standards that address the issues of sensitization of employees and customers on green issues. The results of the driver CSR reveal that the current status is not an effective approach for influencing positive eco-friendly outcome. This study recommends a policy aimed at censuring some of the CSR activities which take up public finances or lead to tax wavers yet they have no relation to green. This should also be backed by research to ensure effectiveness of CSR in responding to green issues at industry level and the environment. From the perspective that perceived business benefits and internal stakeholders emerged as strong drivers, policy guidelines on how they government can leverage on the areas such as renewable energy techniques including Private Public Partnerships (PPP) may be pursued.

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. Managers can consider exerting pressure on suppliers both

large and small to initiate 'green multiplier effects' which can help the spreading of the GSC concept among the firms. Managerial recommendations drawing from the results of internal stakeholders show the need to benchmark and to set environmental internal standards to address the issues of employee involvement and customer education and training of suppliers on green issues.

The significant results of the variable perceived business benefits review that firms can lobby the government for favourable fiscal policy and its support in collection and dissemination of statistical findings of green economy information/data. Green issue is a global agenda and the government should endeavor to create avenues for the local firms to engage more with international green economies. Participation of firms in award winning projects was very poor hence the recommendation for firms to invest in technological development to become more innovative.

5.5 Areas for further research

The findings of the study, as summarized in the previous section have several implications for theory, methodology and practice. Overall, the findings of the study provide substantial support for the conceptual framework. Specifically, the results demonstrate that green issues (drivers) are powerful tools that can directly lead to adoption of green supply chain strategy viewed as a solution to environmental challenges facing the firms and a myriad of stakeholders seeking eco-value.

Firstly, the findings have contributed to the existing stock of knowledge in the literature of green supply chain strategy in manufacturing firms of a developing country. Despite this known fact of the importance of green supply chain strategy adoption in relation to green issues there had been a gap in empirical knowledge in developing countries, in this case Kenya, about the practice of firms in response to green issue (drivers) and the effect of each specific driver on adoption of the strategy. Five sectors among the twelve manufacturing sectors registered with KAM were used in this study and the findings have ultimately contributed in filling this knowledge gap.

The result of this research brings additional evidence on responsive and proactive green strategic choice manufacturing firms make, pressured by a myriad of eco-friendly stakeholders in addition to green issues being a top global agenda. The practical implication of this study is to provide insight and knowledge to manufacturing enterprises, government, community, suppliers and several other supply chain members. Ideally, internal stakeholders were found to be the top drivers of an eco-friendly system in Kenya. Secondly, manufacturing contributes to economic growth as envisioned by the government of Kenya Vision 2030 and due to its relationship to the environment, both the government and manufacturing firms should drive the implementation of responsive and proactive approach towards emerging green issues. This research revealed a major awareness gap and a weak legal regime for addressing green issues. Research to explore the role of capacity building for a green economy is recommended. Thirdly, research to explore the relationship between green supply chain strategy adoption and a firm's performance is recommended.

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APPENDICES

Appendix i: Letter of Introduction



**Jomo Kenyatta University of Agriculture and Technology
School for Human Resource Development
Entrepreneurship & Procurement Department**

Telegrams "Thika"
Telephone: 067 52711 ext 2239
Fax: 067 52164

Office of the Chairman
P.O. Box 62000
NAIROBI

Date: 24/01/2014

Ref: JKU/SHRD/ EPD/PhD /14(06)

TO WHOM IT MAY CONCERN:

Dear Sir/Madam,

RE: PhD PROPOSAL FOR: MS. MWIRIGI PURITY (HD433-0617/2010)

This is to introduce to you **Ms. Mwirigi** who is a student pursuing Doctor of Philosophy degree in Business Administration Program in the Department of Entrepreneurship and Procurement in the School of Human Resource Development at Jomo Kenyatta University of Agriculture and Technology.

The student is currently undertaking a research proposal on: **"Drivers of Adoption of Green Supply Strategy by Manufacturing Firms in Kenya"** in partial fulfilment of the requirement for the programme.

The purpose of this letter is to request you to give the student the necessary support and assistance to enable her obtain the necessary data for the research. Please note that the information given is purely for academic purposes and will be treated with strict confidence.

Thank you.

Yours faithfully,


**PROF. G. S. NAMUSONGE, Ph.D.,
CHAIRMAN, DEPARTMENTAL POSTGRADUATE STUDIES COMMITTEE**


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Appendix ii: Questionnaire

Drivers of adoption of green supply chain strategy by manufacturing firms in Kenya

A. GENERAL INFORMATION

1. Particulars of the firm

Please fill in your business category/sector.....

2. Title of manager/s engaged in procurement/supply chain activities and or environmental management:

.....

3. Number of employees:

- a) Below 100 []
- b) Between 101 and 500 []
- c) Over 501 []

4. Annual turnover:

- a) Below Kshs 50 million (small) []
- b) Between Kshs 51M and 200M (medium) []
- c) Above Kshs 201M (large) []

B. DRIVERS OF GREEN/ENVIRONMENTAL STRATEGY

Indicate the extent to which actions listed below exert pressure to your firm (where: **5**= very high, **4**= high **3**= moderate **2**= low, **1**= not at all)

a	Regulatory Pressure	5	4	3	2	1
i	Pressure to comply with various Acts that have implication to the environment for example; forestry, Water, waste disposal and the Constitution of Kenya 2010					
ii	Pressure to comply in order to secure tenders for example; Energy regulatory commission (ERC) license					
iii	Loss or closure of business due to new regulatory policies for example ban on use of certain materials that are critical to your operations					
iv	Trade barriers due to lack of international certification for example ISO 14001, Kyoto protocol					
v	International restrictions shipment of goods					
vi	Pressure from environmental regulations in other countries					
vii	Regional environmental regulation for example; Rwanda prohibits use of polythene bags					
viii	Pressure to comply with annual environmental audits and perpetual inspections					

(ix) What other key factors relating to government policies exert pressure to your business?

.....

(x) Has your firm adopted any strategy to respond to green challenges resulting from government's policies? YES NO

If your answer is YES, briefly explain

b	Customer Pressure (select extent to which actions listed exert pressure to your firm, where 5 is very high and 1 not at all)	5	4	3	2	1
i	Loss of customers whose demand for greener products is not met					
ii	Disposal and transport issues/challenges					
iii	Shortage of quality raw materials as critical input to your operations					
iv	Pressure from suppliers demanding green standards					
v	Pressure from NGOs, green movements, and financing institutions who may demand a good environmental policy					

vi	Pressure from the community for want of safer and cleaner environment					
vii	Marketing of green products by marketers/competitors					

(vii) What key factors contribute to your firm's desire to respond to customer demands?.....

c	Perceived Business Benefits (select extent to which actions listed influence your firm, (where 5 is very high and 1 not at all))	5	4	3	2	1
i	Cost effectiveness for example; innovativeness resulting in use of cheaper alternatives					
ii	Marketability of green products – perception that green products are more marketable					
iii	Easy access to foreign markets					
iv	Competitive advantage					
v	Improved customer-supplier relationships					
vi	Receiving innovative green/environmental awards					

vii	Earning of carbon credits – to what extent do you consider it important					
-----	---	--	--	--	--	--

(viii) Has your firm recorded growth in profits since as a result of pressure to achieve the above? YES No.....

(ix) If your answer is YES, please select your growth percentage category as shown below:

Less than 5% Between 6% and 15% Above 15%

d	Corporate Social Responsibility (indicate extent to which actions listed exert pressure to your firm, (where 5 very high 1 not at all))	5	4	3	2	1
i	Desire to be market leader in green initiatives					
ii	Desire to promote societal welfare					
iii	Believe that it is your firm's responsibility to minimize negative environmental effects on the natural environment					
iv	Firm's desire to prevent environmental problems for example; global warming and water pollution .					
v	Improved organizational image					

vi	Ethical and moral obligation					
vii	To underscore the commitment in your service charter					

(viii) How many green CSR initiatives has your firm undertaken in the last 3 years?

.....

e	Internal Stakeholders (indicate extent to which actions listed exert pressure to your firm (where 5 very high, 1 not at all)	5	4	3	2	1
i	Priority of CEO and/or Board of Directors					
ii	High cost of energy					
iii	High cost of production inputs					
iv	Low employee morale related to green issues					
v	Complaints due to high health and safety premiums					
vi	Employee level of awareness of environmental issues					
vii	Firm's desire to participate in climate change campaign and					

	performance targets					
viii	Marketing departments environmental priority for green image					
ix	Increased hype for products with green element					

C. ADOPTION OF GREEN SUPPLY CHAIN STRATEGY (GREEN PRACTICES)

The list below consists of the most common green projects firms undertake. Please select the extent by which each activity is practiced by your firm as follows: **5= highly, 4= high 3= moderately, 2= rarely, 1= not at all**

	Green projects and practices	5	4	3	2	1
i	Eliminate/reduce hazardous /toxic materials from products					
ii	Eliminate/reduce hazardous /toxic chemicals from manufacturing processes					
iii	Implement design for environment practices in product development and to reduce, or repurpose manufacturing waste					
iv	Reduce energy consumption in manufacturing and buildings					

v	Increase the use of renewable energy sources for example; solar, wind and geothermal					
vi	Optimize transportation operations to reduce carbon footprint					
vii	Recycle returned products or scrap material					
viii	Reduce packaging					
ix	ISO certification for example; ISO 14001, ISO 22000 and ISO 9000:2008					
x	Improved capacity utilization					
xi	Increased campaign for green products, processes and activities for example; tree planting					
xii	Use of green criteria in technical specifications of contracts					
xiii	Ethical and responsible tendering approaches					
xiv	New company environmental policy					
xv	Participation in award winning environmental programmes					
xvi	Increased green awareness training and campaigns					

2. What would you cite as factors hindering the implementation of the above activities in your firm?

3. How would you rate your organizations responsiveness to green issues?
.....

4. Show extent by which the factors listed below affect adoption of green supply chain strategy as follows: **5**= Great extent, **4**=High extent, **3**= Moderate extent, **2**= low extent, **1**= not at all

	Drivers/Factors	5	4	3	2	1
A	Investment costs					
B	Lack of management support					
C	Lack of government support					
D	Lack of understanding of the concept and its benefits					
E	Lack of awareness due to limited examples locally					
F	Lack of technical expertise by regulators and other proponents					
G	Existence of other techniques or initiatives					
H	Lack of involvement of employee by management					

THANK YOU

Appendix iii: List of Manufacturing Firms

BUILDING, MINING & CONSTRUCTION

1. Athi River Mining Ltd
2. Bamburi Cement Limited
3. Bamburi Special Products Ltd
4. Central Glass Industries
5. East Africa Portland Cement
6. Flamingo Tiles (Kenya) Limited
7. Glenn Investments Ltd C/O The Mehta Group Ltd
8. International Energy Technik Ltd
9. Karsan Murji & Company Limited
10. Kenbro Industries Ltd
11. Kenya Builders & Concrete Ltd
12. Manson Hart Kenya Ltd
13. Orbit Enterprise Ltd
14. Saj Ceramics Ltd
15. Vallem Construction Ltd

ENERGY, ELECTICALS & ELECTRONICS

1. Asano International Limited
2. Assa Abloy East Africa Limited
3. Aucma Digital Technology Africa Ltd
4. Avery East Africa Ltd
5. Baumann Engineering Ltd
6. Biogas Power Holdings(EA)Ltd
7. Centurion Systems Ltd
8. Digitech East Africa Ltd

9. East Africa Cables Ltd
10. Holman Brothers (E.A) Ltd
11. IberaAfrica Power (EA) Ltd
12. International Energy Technik Ltd
13. Kenwest Cables Ltd
14. Kenya Petroleum Refineries Ltd
15. Kenya Power Ltd
16. Libya Oil Kenya Limited (Formerly Mobil Oil Kenya)
17. Manufacturers & Suppliers (K) Ltd
18. Marshall Fowler (Engineers)
19. Metlex International Ltd
20. Metsec Ltd
21. Mustek East Africa Limited
22. Nationwide Electrical Industries Ltd
23. Optimum Lubricants Ltd
24. PCTL Automation Ltd
25. Pentagon Agencies
26. Power Technics Ltd
27. Protel Studios
28. Reliable Electricals Engineers (Nrb) Ltd
29. Socabelec (EA) Ltd
30. Sollatek Electronics (Kenya)Ltd
31. Specialised Power Systems Ltd
32. Synergy-Pro
33. Virtual City Ltd

FOOD & BEVERAGES

1. Africa Spirits Ltd
2. Agricultural & Veterinary Supplies Limited (AGRI-VET)

3. Agriner Agricultural Development
4. Agro Chemical and Food Company Ltd
5. Arkay Industries Ltd
6. Al-Mahra Industries Ltd
7. Alpha Fine Foods Ltd
8. Alpine Coolers Limited
9. Bakers Coner Ltd
10. Belfast Millers Ltd
11. Beverage Millers Ltd
12. Bidco Oil Refineries Ltd
13. Bio Food Products Ltd
14. British Tobacco Kenya Ltd
15. Brookside Dairy Ltd
16. Bunda Cakes & Feed Ltd
17. Buzeki Dairy Limited
18. C. Dormans Ltd
19. C.Czarnikow Sugar East Africa Ltd
20. Cadbury Kenya Ltd
21. Candy Kenya Ltd
22. Capwell Industries Ltd
23. Chirag Kenya Ltd
24. Coca Cola East & Central Africa Ltd
25. Corn Products Kenya Ltd
26. Deepa Industries Ltd
27. Del Monte Kenya Ltd
28. East Africa Breweries Ltd
29. East Africa Seed Co. Ltd
30. Eastern Produce Kenya Ltd(Kakuzi)

31. Edible Oil Products
32. Erdemann Co. (K) Ltd
33. Europack Industries Ltd
34. Excel Chemicals Ltd
35. Farmers Choice Ltd
36. Fresh Produce Exporters Association of Kenya
37. Frigoken Ltd
38. Giloil Company Ltd
39. Githunguri Dairy Farmers Co-operative Society
40. Global Fresh Ltd
41. Gonas Best Ltd
42. Green Forest Foods Ltd
43. Highlands Cannery Ltd
44. Insta Products (EPZ) Ltd
45. Jambo Biscuits (K) Ltd
46. James Finlay Kenya Ltd
47. Kamili Packers Ltd
48. Kapa Oil Refineries Ltd
49. Kenafri Industries Ltd
50. Kenblest Ltd
51. Kenchic Ltd
52. Kenya Nut Company Ltd
53. Kenya Sweets Ltd
54. Kenya Tea development Agency
55. Kenya Wine Agencies Limited
56. keroche Industries Ltd
57. Kevian Kenya Ltd
58. Koba Waters Ltd

59. Kuguru Food Complex Ltd
60. Kwality Candles & Sweets Ltd
61. London Distillers (k) Ltd
62. Mafuko Industries Ltd
63. Manji Food Industries Limited
64. Mastermind Tobacco (K) Ltd
65. Mayfeeds Kenya Ltd
66. Melvin Marsh International
67. Mini Bakeries (Nbi) Ltd
68. Miritini Kenya Ltd
69. Mjengo Ltd
70. Nairobi Bottlers Ltd
71. Nairobi Flour Mills Ltd
72. NAS Airport Services Ltd
73. Nestle Foods Kenya Ltd
74. Norda Industries Ltd
75. Nutro Manufacturers EPZ Ltd
76. Palmhouse Diaries Ltd
77. Patco Industries Limited
78. Pearl Industtries Ltd
79. Pembe Flour Mills Ltd
80. Premier Food Industries Ltd
81. Pristine International Ltd
82. Proctor & Allan (E.A.) Ltd
83. Promasidor Kenya Ltd
84. Rafiki Millers Ltd
85. Razco Ltd
86. Re-Suns SpicesLtd

87. Sigma Supplies Ltd
88. Softa Bottling Co. Ltd
89. Spice World Ltd
90. Sunny Processors Ltd
91. Trufoods Ltd
92. Unga Group Ltd
93. Usafi Services Ltd
94. Valuepak Foods
95. W.E. Tilley (Muthaiga) Ltd
96. Wanainchi Marine Products (K) Limited
97. Wanji Food Industries Limited
98. Wrigley Company (E.A.) Ltd

PHARMACEUTICAL & MEDICAL EQUIPMENT

1. African Cotton Industries Ltd
2. Alpha Medical Manufacturers Ltd
3. Beta Healthcare International
4. Biodeal Laboratories Ltd
5. Biopharma Ltd
6. Cosmos Ltd
7. Dawa Limited
8. Elys Chemical Industries Limited
9. Gesto Pharmaceuticals Ltd
10. Glaxo Smithkline Ltd
11. Global Merchants Ltd
12. KAM Industries
13. Laboratory & Allied Limited
14. Manhar Brothers (K) Ltd

15. Medivet Products Ltd
16. Novelty Manufacturing Ltd
17. Osschemie (K) Ltd
18. Pharm Access Africa Ltd
19. Pharmaceutical Manufacturing Co. (K) Ltd
20. Regal Pharmaceuticals Ltd
21. Revital Healthcare (EPZ) Ltd

PLASTICS & RUBBER

1. ACME Containers
2. Afro Plastics (K) Ltd
3. Betatrad (K) Ltd
4. Bobmil Industries Ltd
5. Complast Industries Limited
6. Dune Packaging Limited
7. Dynaplus Ltd
8. Elgon Kenya Ltd
9. Elson Plastics of Kenya Ltd
10. Five Star Industries Ltd
11. General Plastics Ltd
12. HI-Plast Ltd
13. Jamlam Industries
14. Kamba Manufacturing (1986) Ltd
15. Kenpoly Manufacturers Ltd
16. Kentainers Ltd
17. Kenya Suitcase Manufacturing Limited
18. King PLastic Industries Ltd
19. L.G. Harris & Co. Ltd

20. Laneeb Plastic Industries Ltd
21. Manplast Industries Ltd
22. Metro Plastics Kenya Ltd
23. Nairobi Plastics Ltd
24. Ombi Rubber Rollers Ltd
25. Packaging Industries
26. Packaging Masters Ltd
27. Plastic Electronics
28. Plastics & Rubber Industries Ltd
29. Polyblend Ltd
30. Polyflex Industries Ltd
31. Polythene Industries Ltd
32. Premier Industries Limited
33. Princeware Africa (Kenya) Ltd
34. Prosel Ltd
35. Qplast Industries Ltd
36. Rubber Products Ltd
37. Safepak Ltd
38. Sameer Africa Ltd
39. Sanpac Africa Ltd
40. Signode Packaging Systems Ltd
41. Silpack Industries Ltd
42. Singh Retreads Ltd
43. Solvochem East Africa Ltd
44. Springbox Kenya Ltd
45. Styroplast Ltd
46. Sumaria Industries Ltd
47. Super Manufacturers Ltd

48. Techpak Industries
49. Thermopak Limited
50. Treadsetter Tyres Ltd
51. Uni-Plastics Ltd
52. Wonderpac Industries Ltd