

**EFFECT OF ADOPTING GREEN SUPPLY CHAIN
MANAGEMENT PRACTICES ON PERFORMANCE OF
MANUFACTURING FIRMS: THE CASE OF BUILDING, MINING
AND CONSTRUCTION SECTOR IN KENYA**

BY:

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DECLARATION

This research is my original work and has not been submitted for a degree award in any other university.

Signed



Date 30/08/2023.....

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Declaration by the Supervisor

This research has been submitted with my approval as University of Nairobi Supervisor.

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DEDICATION

I dedicate this to my son Myles Mwangi and encourage him to push himself to become the best he can be in life.

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ABBREVIATIONS AND ACRONYMS

BMC - Building, Mining and Construction

EMS – Environment Management System

GSCM - Green Supply Chain Management

KAM - Kenya Association of Manufacturers

NEMA - National Environment Management Authority

RDT - Resource Dependence Theory

TBL - Triple Bottom Line

ABSTRACT

Traditionally firms had been concerned about their financial performance since the key aim was ensuring a return on the investment made by shareholders. However, the growth of social and environmental concern has led firms to become answerable to other stakeholders who are interested in understanding firms' approach towards managing sustainability and environmental issues. This concerns have necessitated firms to initiate programs in Green Supply Chain Management (GSCM) practices. This study aimed to establish the effect of adopting GSCM practices on performance of manufacturing firms within the building, mining and construction (BMC) sector in Kenya by identifying to what extent firms have adopted GSCM practices and determining what has been the effect of them adopting the GSCM practices on their performance. The research incorporated descriptive survey design targeting 54 firms who are members of Kenya Association of Manufacturers (KAM). The primary tool of data collection used was by means of a semi-structured questionnaire which had a 5 point Likert scale structure. The data diagnostics test showed that the data followed the normal distribution and was valid for analysis. SPSS was used to analyze the quantitative data and the results were presented in tables. The data was processed using multivariate analysis using Likert scale. A regression model showed the relationship between the study variables. It was deduced that GSCM practices have a statistically significant effect on firm performance. The data showed that the extent of adoption of GSCM practices was moderate and there was a positive correlation between GSCM practices and firm performance. The study recommends that firms in the BMC sector in Kenya should adopt GSCM to positively influence their firm's performance. The study also recommends a review of how green procurement is implemented to avoid its adoption which showed a negative impact in relation to firm performance.

Key words: Green Supply Chain Management Practices, Firm Performance, Resource Dependency Theory.

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

Industrialization has increased energy and material consumption, as a result, there are various environmental concerns amongst which are high carbon emissions, environmental degradation, toxic pollution and chemical spillages. These concerns have resulted in control by regulatory agencies, customer preferring organizations with environmental control programs and pressure from community where the firms operates. Therefore, firms have to monitor and constantly improve their environmental and social performance to survive and remain competitive. Globally firms are using sustainability as a means of improving their firm's performance. They have realized that GSCM being implemented in business operations has significant benefits internally, it fosters better relationships with customers as well as with their suppliers. Moreover, to meet the environmental demands from a number of key stakeholders and regulators, several firms have begun to implement GSCM practices (Chieh-Yu, Syed, Yi-Hui, & Mohammed, 2020). Traditionally firms only focused on their financial performance since the key aim was ensuring a return on the investment made by shareholders. However, the growth of social and environmental concern has led firms to become answerable to other stakeholders who are interested in understanding firms' approach towards managing sustainability and environmental issues. It is still unclear how focusing on social and environmental related activities has affected performance of firms and is an area that needs more research. The effect of firms adopting GSCM practices in their entire supply chain is an area that is gaining attention. Increasingly industrial players, policy makers and researchers are seeking to understand GSCM and its correlation to a firm's performance (Sarkis, 2014).

This study is anchored by three theories which are: The first is the resource dependency theory which considers a firm as an open system which utilizes multiple external resources to achieve its desired product and performance (Pfeffer & Salancik, 1981), (Davis & Cobb, 2010). A firm has to formulate strategic and long-term relationships and partnerships with employees, customers and all other key players to achieve the desired performance (Cai, Souza, Goh, Li, & Lu, 2008; Zehir & Findikli, 2018). The second theory is the stakeholder theory which postulates that a firm's performance and survivor is dependent on its relationships with stakeholders. Third is

the institutional theory which states that every firm must operate within set rules, regulations and norms which might push a firm to implement or change its procedures and processes without which it will not survive. (Hillman & Keim, 2001).

According to KAM the manufacturing firms in BMC Sector in Kenya is subdivided into four main subsectors which are building and construction accessories subsector, the cement manufacturing subsector, the precast & ready-mix concrete subsector and the quarry and mining sub-sectors (KAM, 2021). Globally the annual material extraction from the Earth has increased drastically from 22 to 70 billion tons between 1970 and 2010 (UNEP, 2016). The construction sector in Kenya had an annual growth rate of 13.8% from 2015 to 2019. Firms in the BMC sector are major players in extraction of materials from the earth. There is a growing need to understand how GSCM practices are implemented in this sector especially in developing countries such as Kenya (KAM, 2021). In Kenya annual minerals production increased by 700% from 50,000 metric tons to 400,000 metric tons between 2009 and 2019. This increase within ten years needs to be monitored to avoid adverse effects to the environment and society (CEIC Data, 2021).

1.1.1 Green Supply Chain Management Practices

The concept of GSCM practices have been widely defined as environmental innovations that incorporates environmental consciousness into operations of a firm. Worldwide organizations have developed Environmental Management Systems (EMS) to improve and track their environmental performance (Seman, Zakuan, Jusoh & Arif, 2012). GSCM practices are the concepts and activities that involve environmental management practices and procedures employed by organizations across its supply chain (Chien & Shih, 2007).

According to Chien and Shih (2007) GSCM is very wide and can include internal environment management, eco-friendly product and process designs, external GSCM and investment recovery. They also highlight that other practices such as green distribution, procurement, material management, green manufacturing as well as reverse logistics can be used in similar studies. Ndua and Were (2018) used reverse logistics, green packaging, waste management system and green procurement as GSCM practices in their study. This study will use green procurement, reverse logistics, green manufacturing, internal environment management and green

distribution. The choice of the practices is based on the characteristics of the context of the study and the firms therein which pass large volumes of earth extracted materials through complex processes to make products and transport their raw material and finished products over long distances.

A study on the effects of GSCM on environmental performance showed a positive impact among tea firms in Kericho County. However, the results were statistically insignificant since most firms were on their early stages on implementing GSCM practices. Kyalo (2015) studied GSCM practices among alcoholic beverages manufacturers in Nairobi, Kenya. His research concludes that firms that implemented GSCM practices showed improved operation performance. Laari (2016) established that there were benefits of GSCM practices implementation on a firm's performance financially, operationally as well as on environmental for manufacturing and logistics firms in Finland.

1.1.2 Firm Performance

Performance can be defined as a set of indicators or parameters that best give valuable information on the process of attaining objectives. Firm performance is the most important research area in management research, it concentrates on stakeholders, the product market circumstances, and time (Pierre, Johnson, & Devinney, 2009). In the past firms only considered their financial performance as a measure of success. However, increasingly firms are tracking their non-financial performance due to interest from stakeholders, the regulators, government or management. Key non-financial performance measures being widely recognized include environmental performance, social performance (Kamilah & Shafie, 2016).

There is no universally agreed dimensions or indicators of measuring firm performance due to the great variability of firm's characteristics and attributes. The most holistic firm performance measurement available is the triple bottom line (TBL) which considers the three broad facets of performance which are environmental, economic and social performance. Using TBL the firm's performance can be extended beyond the return on investment and quality of product to the entire supply chain and product life cycle (cradle to cradle). (Elkington, 1997). The indicators of financial performance used in this study are resource cost saving, energy cost reduction and financial profit (Muma et al, 2014). Secondly, the indicators of social

performance are stakeholder involvement, employee satisfaction/turnover and number of accidents or safety incidents (Odock, 2016), (Muma et al, 2014). Thirdly, the indicators of environmental performance are energy efficiency, material & water efficiency and recycling and waste management (Muma et al, 2014).

1.1.3 Building, Mining and Construction Sector

KAM is a body representing all manufacturing firms in Kenya. The BMC Sector represents a wide range of diverse firms which are closely linked. Under KAM the BMC Sector is divided into four subsectors. The subsectors are Building and Construction Accessories subsector, Cement Manufacturing subsector, Precast & Ready-Mix Concrete subsector, and Quarry and Mining sub-sectors (KAM , 2021).

The Building and Construction Accessories sub-sector comprises of firms that manufacture construction glass, ceramic tiles for floor and walls, manufacturers of marbles, manufacturers of roofing tiles, bricks and all other alternative building materials. The cement manufacturing sub-sector comprises of all cement manufacturing plants. Both clinker making lines and clinker grinding plants. There are eight established cement manufacturers in Kenya It is the sector that extracts material from the earth and among the largest producers of carbon dioxide to the atmosphere. (Shailendra, Adrian, Sandeep, Stefan, & Martin, 2013). The precast and ready-mix concrete sub sector comprises of manufacturing firms that produce precast concrete and ready mix products used directly by construction sites. The precast concrete includes concrete used in utility structures such as electricity poles, water/wastewater channels and products such as modular paving blocks. The quarry and mining sub-sectors comprises of firms involved in mining of non-metallic minerals and other industrial minerals. Some of the minerals are soda ash, kaolin, titanium, fluorspar, and gemstones (KAM , 2021).

According to KAM 2021, the BMC sector had a 6.3% contribution to Kenya's GDP. The sector is forecasted to exceed 10% of GDP contribution by 2030. The BMC sector is a resources intensive sector and with the expected growth in the Kenyan economy will only put more pressure on available resources. The BMC sector has come under strict regulation from the environment regulating body National Environment Management Authority (NEMA) due to emission, pollution and land

degradation (NEMA, 1999). Firms in the sector are therefore committed to finding ways of surviving and the regulation and resource scarcity within Kenya.

1.2 Research Problem

GSCM practices have proved to improve performance in organizations especially in manufacturing. However, there is a research gap in investigation how significant GSCM practices are on the performance of an organization. There is need for more data on GSCM practices' impact on performance in various sectors and industries. GSCM practices touch on every area of an organizations operation in the quest of ensuring environmental considerations are met and therefore its effect of firm performance should also use indicators that are holistic and representative of general performance of the firm.

Priyashani and Gunarathne (2020) studied GSCM practices and its relationship with organizational performance which was carried out in Sri Lanka among manufacturing firms. They recommended further research on the influence that GSCM has on other facets of a firm's performance. They proposed future areas of studies in firm's performance from a social and economic perspective. According to Muhammad and Danish (2019) who studied GSCM and firm performance in Karachi there is need for research study on GSCM practices in the transportation and construction sector. Laari (2016) who studied GSCM and environmental performance indicators of firms in Finland. He suggested that a holistic study of the effects of GSCM which integrates environmental, economic and social dimensions would expound on the understanding of how firms can ensure all three dimensions of the triple bottom performance are considered and none is compromised. Muma et al (2014) concluded that the effects of GSCM practices on firm performance were statistically insignificant. He also noted that firms within Kenya's tea sector had not harnessed the benefit of GSCM a variety of barriers such as lack of funds, capital intensive investment, poor technology and poor corporate culture amongst others. Salma (2014) whose study concentrated on the effects of GSCM practices when adopted on performance of organisations in Kenya from a financial perspective and suggested future study to establish the effects of implementation of GSCM practices on a firm's environmental and operational performances. Nyakundi (2013) recommended further studies to be conducted how performance of companies in the mining sector is affected by them adopting GSCM practices.

This research sought to answer two research questions which are: Firstly, what GSCM practices had been adopted which is specific to manufacturing firms in the BMC sector within Kenya?; Secondly, what effect has adopting GSCM practices had on the firm performance of organizations within the BMC sector?

1.3 Research Objective

These research study has the following objectives:

- i. To identify the extent of adoption of green supply chain management practices by firms in the building mining and construction sector in Kenya.
- ii. To determine the effect of adoption of green supply chain management practices on firm performance of firms within the building mining and construction sector in Kenya.

1.4 Value of the Study

To the academia this research will contribute to the body of knowledge about GSCM practices and firm performance which is a research area which has not been widely studied especially in developing countries in Africa. The study of the BMC sector will also open room for researcher to better understand the unique nature of this sub-sectors which are closely linked and their interactions.

Policymakers and regulators will get information on the GSCM practices, its implementation and benefits to firms in the BMC sector in Kenya. They will also benefit from identification of challenges firms are facing in the sector in implementing GSCM practices which can help them in policies and laws formulation.

Practitioners will gain knowledge about the particular types of GSCM practices that have the largest benefit to the performance of an organization. Organizations managers can use the principles and indicators to be discussed to monitor and track their firm's performance in GSCM practices implementation. This will help justify continued investment of resources in GSCM in other areas.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter we will review information from various research and publications done on topics related to the scope of the research. Findings from research papers of academicians, scholars and authors related to GSCM practices are presented. The chapter is organized in three parts. First the theories anchoring the research are explained, then empirical literature will be outlined and lastly the conceptual framework of the study is presented.

2.2 Theoretical Literature Review

The theories onto which this study is anchored are; resource dependency theory, the stakeholder theory and the institutional theory.

2.2.1 Resource Dependence Theory

Resource Dependence Theory (RDT) states that a firm can be considered to operate as an open system which is largely dependent on resources outside its control in order for it to achieve its desired product and performance. The performance of a firm can be attributed to its long-term and strategic relationships with suppliers and customers (Pfeffer & Salancik, 1981). Pfeffer and Salancik (2003) refined the definition of RDT as the range of key players and powerful authorities that have control within the environment that the firm operates; there is uncertainty of resource, scarcity or abundance of resources which are critical to firm operation; and the interconnectedness amongst relationships of resources or interdependence amongst organizations.

Firms GSCM practices involve an open system as defined in RDT. There is sourcing raw materials from different suppliers, transporting raw material and finished products using various logistic firms and internal operational support from other firms in areas outside their core competencies. An organizations performance can be considered to be dependent on how the firm strategically handles the external environment (Pfeffer & Salancik, 1981).

The limitations of the theory is where a firm controls all the resources from raw material to transportation of finished products to the customers then the dependence on external environment is limited contrary to RDT (Matteo , Kamrul , & Himanshu, 2015).

2.2.2 Stakeholder Theory

Stakeholder theory stipulates that a firm is expected to create value to all stakeholders and not the traditional norm of creating value to shareholders only. These stakeholders include employees, suppliers, shareholders, surrounding communities and government. Therefore, a firm needs to maintain good relationships with the stakeholders for its survivor (Hillman & Keim, 2001).

This theory stipulates that external pressures can affect the firm's decisions and consequently affect its performance. Firms have changed from the previous single bottom line focus on financial performance and have to consider the social and environmental facets of performance due to coercive, normative and mimetic rivers from its stakeholders (Saeed & Kersten, 2019). GSCM has developed due to the adverse effects some industrialization activities have caused and firms have to control and mitigate their activities. The firm has to operate in a way that it exists in harmony with the environment and society in which it operates.

The limitations of the stakeholder theory is that in the needs of various stakeholders are sometimes in conflict or too complex to fulfill and the firm is unable to meet the demands.

2.2.3 Institutional Theory

Institutional theory states that every firm must operate within specific rules and norms set without which it risks its survival (Cai, Souza, Goh, Li, & Lu, 2008). Institutional theory helps understand the types of external factors that push a firm to implement or change its procedures and processes.

Many organizations have been influenced or forced to implement GSCM practices due to pressures from regulators especially government, suppliers, communities or customers. The impact of this pressures will affect the areas that the firm focuses its attention on to drive social, economic and environmental performance in accordance with the external pressure (Cai, Souza, Goh, Li, & Lu, 2008).

2.3 Empirical Literature Review

Priyashani and Gunarathne (2020) studied how GSCM practices affect organization's performance for manufacturers in Sri Lanka. The results showed that GSCM has no statistical significance on environmental and economic performance of a firm. However, they concluded that there is a positive correlation with organizational

performance. They recommended further research on how GSCM practices affects firm's performance on other aspects especially social and financial performance and also suggested use of other indicators other than recovery of investment, eco-design, environment management, green purchasing, and reverse logistics. Muhammad and Danish (2019) studied GSCM and firm performance in Karachi and concluded that there is need for research study on GSCM practices in the transportation and construction sector. Laari (2016) studied GSCM practices and firm performance in Finland and analysis of the data showed that firms in competitive markets where differentiation is necessary had a higher tendency to implement advanced forms of GSCM practices especially if their operations have some environmental effect. Lakashmimeera and palanisamy (2013) performed a study and developed a conceptual framework on GSCM practices in India. GSCM was a new area of study that needed a conceptual framework to be developed. The study proposed four indicators of GSCM practices which are inbound practices, operational practices, outbound practices and reverse logistics. The model was general and they recommended it's modified for specific application. In a study that investigated the GSCM practices implementation by industries within electronic sectors within Taiwan. The effects of GSCM practices on environmental performance and financial performance were studied. The research study involved detailed interviews and questionnaire. After analysis using statistical tools the manufacturing firms were found to have adopted green procurement had been adopted together with green manufacturing as a reaction to the external and international pressure. The firms had also attained better environmental and financial performances from implementing the GSCM practices.

Nimpano (2021) studied the effects of adopting GSCM practices on on supply chain performance amongst the agricultural manufacturing companies in Rwanda. His findings showed that a firm's environmental management coupled with green purchasing, investment recovery, eco-design showed a positive correlation with supply chain performance. Odock et al (2016) performed a study to evaluate how adoption of GSCM practices affected performance of firms with ISO 14001 certification in East Africa. Primary data collected from the firms was through the persons in charge or responsible for environmental issues in each organization. The results showed that the relationship between adoption of GSCM practices and firms

performance was positive. The recommendation from the study was that manufacturing firms to implement GSCM practices cross their entire supply chain. Odock also proposed that regulators should impose stricter environmental legislations and incentivize firms for implementing GSCM practices to increase the speed at which firms implement the GSCM practices. The limitation of the study is that only ISO 14000 firms were studied which means they already had made significant progress in environmental practices and hence could not provide a representative data on extent of implementation of GSCM practices in other non-certified firms. Ojo, Mbohwa, and Akinlabi in 2014 studied GSCM and its implementation in construction industry in South Africa. They noted that the practices were gaining momentum in most developing countries especially those in South East Asia. They noted that more study had been undertaken on GSCM implementation in manufacturing firms but very few were specific to the construction firms. They proposed the practices implemented in manufacturing firms could be extended to construction firms (Ojo et al, 2014).

A case study investigating the effect of GSCM practices and firm performance of companies in tea factories was done in Kericho, Kenya. The results show that GSCM practices' effect on environmental performance was positive. The recommendation from the study was that firms should adopt GSCM practices. The study cannot be conclusive since it only considered tea firms in one county. The study proposed further investigation of GSCM on individual aspects of performance (Muma et al, 2014). According to Nyakundi (2013) more research study should be conducted in adoption of GSCM practices by different sectors especially the mining and effects on firm performance established. A case study of GSCM among cement manufacturers was done by Kiprop in 2013. The study resulted showed that cement companies had adopt GSCM practices with challenges. He suggested that cement makers should implement GSCM practices (Kiprop, 2013). Mohamed (2012) undertook a study on GSCM practices among manufacturing organizations in Mombasa County in Kenya. Questionnaires were used for data collection. After analysis, the results showed that GSCM practices had a positive effect on performance of the firms. The study stated that GSCM had significant contribution in solving environmental challenges facing firms in Mombasa. Factors hindering adoption of GSCM were also exemplified. The study concluded that further research need to be done in Kenya since GSCM practice

is yet to be adopted to a large extent. The government was mentioned as the key factor responsible for the slow adoption and implementation of GSCM practices.

Table 2.1 Past Studies, Findings and Knowledge Gap

Author	Focus of the study	Research Findings	Research Gap
Mwirigi (2007)	GSCM Practices By Manufacturing Firms (Kenya)	Reverse logistics is the practice that receives least consideration and multinationals corporations were more aware compared to local organizations practice of GSCM.	There is need for more studies in GSCM especially research in the service firms.
Kiprop (2013)	GSCM practices of cement making firms. Kenya (EAPCC – Case study, Kenya)	The study concluded that cement companies had adopt GSCM practices but with many challenges. EAPCC had met immense challenges in implementation and had developed measures to overcome the setbacks so as to benefit from GSCM practices.	In depth understanding of challenges facing the cement industry in GSCM implementation and firm benefits to their implementation.
Muma (2014)	GSCM practices and environmental performance (Tea factories - Kericho, Kenya)	The research study concluded that that GSCM practices effect on environmental performance is positive and significant.	Research on effects of GSCM on other performance indicators of the firms i.e. financial and social.
Ouru (2015)	GSCM practices in large manufacturing firms. (Nairobi, Kenya)	The research study results show that GSCM practices have a wide implementation in large manufacturing firms to a great extent.	Firms benefit from adopting of GSCM practices is not extensively studied.
Odock (2016)	GSCM practices adoption and its effect of performance of manufacturing	Adoption of GSCM practices was found to have a positive correlation with firm performance.	Study of GSCM in Service industry and sector specific studies in manufacturing.

	Firms. (East Africa)		
(Muham	GSCM and Firm	Environmental performance as	There is need for
<p>Green Supply Chain Management Practices</p> <ul style="list-style-type: none"> ➤ Internal Environment Management ➤ Green Procurement ➤ Green Manufacturing ➤ Green Distribution ➤ Reverse logistics 		<p>ial perf no associat → perfor l signif</p>	
(Nimpano , 2021)	GSCM and its effect on supply chain performance among agricultural firms. (Rwanda)	GSCM practices has a positive and a substantial influence on supply chain performance.	Study of GSCM on other manufacturing sectors and using different indicators other than supply chain performance

2.5 Conceptual Framework

Dependent variable

Independent variable

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter explains the techniques and methods to be used to collect as well as analyze the collected data. Research methodology entailed a systematically approach in solving a research problem. The results obtained were used to justify the relevance of the study.

3.2 Research Design

The research study was be a descriptive survey. Cross-sectional data was collected form each firm and analyzed to identify the trends and relationships that exist the between GSCM practices and Firm performance (Salaria, 2012). Many researches in GSCM have taken this research design approach. This design was appropriate since it allowed the researcher to analyze data and draw conclusion from a wide range of a sample population.

3.3 Population of Study

A population in a study refer was the group of persons and items of interest to the research study (Bor, 2021) . The study targeted all manufacturing firms within the BMC sector in Kenya. As per the KAM sector profile there are 54 firms and hence a census is appropriate due to the small number of firms in the population. There was no need of sampling (KAM, 2021). The main reason why study was strictly limited to KAM registered firms was because the BMC Sector included a wide range of firms with no clear clasification and hence this choice will help ease data collection since the registered firms are considered to be more organized and with a clear organizational structure as well as records (Nyakundi, 2013).

3.4 Data Collection

The primary tool of data collection was by means of a semi-structured questionnaire where cross-sectional data was collected. The questionnaire targeted firm's managers in operations, production, finance, energy efficiency, environment or procurement depending with the organizational structure of each specific firms in the BMC sector in Kenya. The questionnaires were either emailed as a google form or delivered by hand to the respondents.

3.5 Operationalization of Study Variables

The study variables operationalization was done to enable easy collection and analysis of data. Respondents in the survey answered questions based the operable parameters which was be selected for each of the variables.

Indicators were used to operationalize the variables in the study. The two variables in this research are GSCM practices and firm performance as mentioned in the conceptual framework. To operationalize the study variables indicators had been developed which were measured using a Likert scale. A Likert scale is a method developed for rating traits, attitudes, or perceptions. Likert scales uses a five point rating method to measure attitude of respondents in a research (Batterton & Hale, 2017). It is the most widely used scale by researchers from all areas of study. Odock *et al.*, (2016) explains that Likert scale is appropriate in cases where there is an opinion, a belief or affect being determined. Likert scale used questions which are simple and easy to understand hence give a convenient way of receiving feedback from respondents in a questionnaire. Likert is also favourable if the information being assesses can't be asked or answered in a definitive and precise or where the information being sought is sensitive and the respondent would rather response using ranges (Kyalo, 2015).

When the data to be collected is difficult ascertain the accuracy such as sales, value of assets and revenue. Moreover, most firms in the study are multi-nationals, private or unlisted organizations which makes it difficult to validate performance data from such organizations due to confidentiality and errors due to variation in financial and accounting principles used by each firm. Due to the reasons explained above the nature of data collected in the study makes it fit to use the Likert scale method of the study (Odock *et al*, 2016).

3.6 Validity and Reliability

To be able to ensure credibility the study findings reliability test and validity tests were conducted. Reliability is the ability of an indicator to produce the same outcome when implemented repeatedly. Cronbach's Alpha was used to establish the data indicator would be consistent, produce precise results and ensure repeatability. The value should range from 0 for no reliability and 1 for perfect reliability. The Cronbach's Alpha from the 6 study indicators was 0.905 which verified each of the

indicators had high levels of reliability. A value of above 0.7 is recommended and all indicators were above the threshold (Taber, 2016). Validity can be defined as how much the indicators selected for the study actually measures exactly what they claims to measure and not something else the validity of the indicator was tested using a pilot study which showed the study indicators would provide the expected results.

3.7 Data Diagnostics

Various tests were carried out on the data as listed in the table below.

Table 3.1 Data Diagnostics Test

Test	Test Statistic	Decision Criteria
Autocorrelation	Durbin-Watson test	1.5 – 2.5
Heteroscedasticity	Koenker Test	The P value to be greater than 0.05
Multicollinearity	VIF	Below 5
Normality	Shapiro Wilk test	Greater than 0.05
Reliability	Cronbach’s Alpha	Greater than 0.7

3.7 Data Analysis

After data collection and diagnostics, the data was analyzed through various inferential statistics technique including regression analysis and other analysis methods were developed for testing and validating of the relationships between the study variables. Multivariate analysis was be used when processing the collected data based on a Likert scale (Carifio & Perla, 2007).

Multiple regression analysis was used as outlined below.

$$Y = \alpha_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + e$$

Where Y is Firm performance, X₁ is Green procurement, X₂ is Green Manufacturing, X₃ is Reverse Logistics, X₄ is Internal Environment Management and X₅ is Green Distribution.

Where β i.e. β_1 , β_2 , β_3 and β_4 are the coefficients of X₁, X₂, X₃, X₄ and X₅ respectively, α is the constant of Y-intercept and e is the error term.

CHAPTER FOUR: DATA ANALYSIS AND FINDINGS

4.1 Introduction

This chapter entails the analysis done on data obtained from collected questionnaires and presentation of study finding with discussion on the study objectives. Quantitative data was analyzed using statistical tools such as SPSS and the results were presented in tables.

4.2 Response Rate

The study targeted all 54 members of KAM under the Building, Mining and Construction Sector in Kenya. Out of the 54 questionnaires sent out to each organization, 39 questionnaires were filled and received back. The remaining 15 questionnaire were not returned due to reasons such as unreachable contacts and emails, unwillingness to respond even after multiple follow ups, restriction of company policy of non-disclosure and failed promises of respondent in providing a response to the questionnaire. The response rate was therefore 72.2% which is sufficient (Mugenda & Mugenda, 1999).

4.3 General Respondent's Information

Table 4.1 presents the years in the respondents have been in the firms. Majority of the respondents have been in the firms for between 5 to 10 years representing 43.6%. 38.5% of the respondents had worked in the firms for periods below 5 years while only 5.1% of the respondents had worked in the firms for periods above 15 years. The number of years the respondents have been in the firms is a reasonable time for them to provide representative information on the firm.

Table 4.1 Years of Experience in Organization

Years	Number in Period	%	Cumulative %
≤ 5	15	38.5	38.5
≥ 5 to <10	17	43.6	82.1
≥10 to <15	5	12.8	94.9
≥ 15	2	5.1	100.0
Total	39	100.0	

Table 4.2 Organization Turnover

	Frequency	%	Cumulative %
< 50 M	7	17.9	17.9
≥ 50 M to <1 B	18	46.2	64.1
≥ 1 B	14	35.9	100.0
Total	39	100.0	

4.4 Descriptive Statistics

This research involves six constructs. Indicators were developed for each of the constructs to enable data collection and analysis. The indicators were evaluated to measure the internal consistency or the reliability of the six constructs in the study and showed a Cronbach's Alpha coefficient of 0.905 which implies there was a high level of consistency and reliability.

4.5 Internal Environment Management

Internal environment management was measured using seven items and the analysis of responses are as shown in table 4.3. A Likert scale was used to assess the extent of implementation of internal environment management with responses ranging from 1 which represented “not at all” and 5 represented “very great extent”. The construct with the highest implementation with a mean of 4.333 was “team responsible for environmental has improved”. It also has a standard deviation of 0.613. The item with least extent of implemented with a mean of 3.564 was “total quality environmental management”. It also had a standard deviation of 0.810. All the other constructs have means between 3.7 and 4.3. The global mean for internal environment management was 3.945 which from the scale of 1 to 5 represents a great extent level of implementation of internal environment management.

Table 4.3 Internal Environment Management Practices Statistics

		Mean	Std. Dev.
IEM1	Senior managers commitment	4.025	0.698
IEM2	Mid-level Managers support	3.769	0.697
IEM3	Team responsible for Environmental has improved	4.333	0.613
IEM4	Total quality environmental management	3.564	0.810
IEM5	Certificates show complied to environmental requirements.	3.949	0.846
IEM6	Environmental management systems in place	3.718	0.876
IEM7	Support environment regulations	4.256	0.706
IEMAvg	Internal Environment Management	3.945	0.609

4.6 Green Procurement

The table 4.6 represents the finding after the analysis which shows the extent of implementation of green procurement practices in firms in the study. To measure green procurement six items were used. A Likert scale was used where respondents gave feedback on extent of implementation of green procurement in their firms. The construct with the highest implementation with a mean of 3.487 was “cooperate with customers for green objectives”. It also has a standard deviation of 0.711. The least implemented construct with a mean of 2.487 was “deals with suppliers’ with EMSs”. It also had a standard deviation of 1.174. All the other constructs have means between 2.5 and 3.2. The global mean was for green procurement was 2.983 which from the scale of 1 to 5 represents a moderate extent of implementation of green procurement.

Table 4.4 Green Procurement Practices Statistics

		Mean	Std. Dev.
GP1	Provides environmental specifications during purchases	3.051	0.904
GP2	Cooperate with customers for green objectives.	3.487	0.711
GP3	Audits supplier’s EMSs.	2.538	1.034
GP4	Deals with Suppliers’ with EMSs.	2.487	1.174
GP5	Cooperates with suppliers for cleaner production	3.128	0.882
GP6	Cooperates with suppliers for green packaging	3.205	0.853
GPAvg	Green Procurement	2.983	0.768

4.7 Green Manufacturing

Green manufacturing was measured using nine items and the analysis of responses are as shown in table 4.7. A Likert scale was used to assess the extent of implementation

of green manufacturing with responses ranging from 1 which represented “not at all” and 5 represented “very great extent”. The construct with the highest implementation with a mean of 3.872 was “products minimize/eliminate hazardous components”. It also had a standard deviation of 0.790. The least implemented construct with a mean of 2.538 out of 5 was “Firm recycles/reuses its internal waste”. It also had a standard deviation of 1.082. All the other constructs have means between 2.9 and 3.8. The global mean for green manufacturing was 3.373 which from the scale of 1 to 5 represents a slightly above moderate extent level of implementation of green manufacturing.

Table 4.5 Green Manufacturing Statistics

		Mean	Std. Dev.
GM1	Reduced raw material and energy consumption	3.769	0.732
GM2	Products enable recycling of material.	3.179	0.984
GM3	Products minimize/eliminate hazardous components.	3.872	0.790
GM4	Products weight less, less time and energy used.	3.385	0.866
GM5	Firm recycles its internal waste.	3.308	0.965
GM6	Products are ease to set up and energy saving.	3.718	0.749
GM7	Products are durable and easily repaired.	3.667	0.970
GM8	Firm uses renewal sources of energy	2.923	0.888
GM9	Firm recycles/reuses its internal waste	2.538	1.082
GMAvg	Green Manufacturing	3.373	0.596

4.8 Green Distribution

Green distribution was measured using ten items and the analysis of responses are as shown in table 4.8. A Likert scale was used to assess the extent of implementation of green distribution with responses ranging from 1 which represented “not at all” and 5 represented “very great extent”. The construct with the highest implementation with a mean of 4.051 out of 5 was “firm disposes old/unreparable vehicles”. It also has a standard deviation of 0.904. The least implemented construct was “alternative energy sources used in transport” with a mean of 2.282 and standard deviation of 0.846. All the other constructs have means between 2.3 and 3.9. The overall mean for green distribution was 3.356 which from the scale of 1 to 5 represents a slightly above moderate extent level of implementation of green manufacturing.

Table 4.6 Green Distribution Statistics

		Mean	Std. Dev.
GD1	Distribution in bulk with full loads	3.897	0.841
GD2	Use efficient mode of transport	3.564	0.709
GD3	Use transport method with less pollution	2.923	0.859
GD4	Use technology to manage distribution	3.385	0.866
GD5	Products delivered directly to final customer	3.538	0.929
GD6	Alternative energy sources used in transport	2.282	0.846
GD7	Priority to customers nearer the facility	3.897	0.928
GD8	Outsources logistics services have EMSs	2.385	1.053
GD9	Vehicle maintenance plan in place	3.641	0.891
GD10	Firm disposes old/unrepairable vehicles	4.051	0.904
GDAvg	Green Distribution	3.356	0.565

4.9 Reverse Logistics

Reverse logistics was measured using nine items and the analysis of responses are as shown in table 4.7. A Likert scale was used to assess the extent of implementation of reverse logistics with responses ranging from 1 which represented “not at all” and 5 represented “very great extent”. The construct with the highest implementation with a mean of 3.359 out of 5 was “systems to monitor how customer used products”. It also had a std dev of 0.733. The least implemented construct with a mean of 1.615 out of 5 was “Incentive program for return of packaging”. It also had a standard deviation of 0.950. All the other constructs have means between 1.62 and 2.75. The global mean for reverse logistics was 2.172 which from the scale of 1 to 5 represents a slightly above small extent of implementation of green manufacturing.

Table 4.7 Reverse Logistics Statistics

		Mean	Std. Dev.
RL1	Awareness on product packaging and end of life	2.744	0.980
RL2	Collection sites for packaging & end of life products	1.897	0.928
RL3	Outsourced for waste emanating from products	1.821	0.984
RL4	Records of quantities of packaging & end of life	2.179	1.059

RL5	Incentive program for return of packaging	1.615	0.950
RL6	Environmental information of product provided	2.872	1.114
RL7	Return of packaging from raw material to supplier	1.667	0.857
RL8	Firm sends packaging & used products in bulk.	1.641	0.974
RL9	Systems to monitor reverse flows in place	1.923	0.971
RL10	Systems to monitor how customer used products	3.359	0.733
RLAvg	Reverse Logistics	2.172	0.711

4.10 Firm Performance

The respondents rated how their firms performed in regards to GSCM practices based on listed items. Using Likert scale which had a scale of 1 to 5 where a variable with a mean of 0.000 to ≤ 1.499 represented “no extent at all”, a mean of >1.500 to ≤ 2.499 represents “small extent”, a mean of >2.500 to ≤ 3.499 represented “moderate extent”, a mean of >3.500 to ≤ 4.499 represents “a great extent” and >4.500 to 5.000 represents “very great extent”.

The responses obtained from the respondents were divided into the three dimensions of firm performance which were: environmental performance constructs, economic performance constructs and social performance constructs.

4.10.1 Environmental Performance

Table 4.8 shows an outline of the results from the returned questionnaires. They are the responses on effects of GSCM practices on their firm’s environment performance based on the selected constructs.

Table 4.8 Environmental Performance Statistics

		Mean	Std. dev
EN1	Extent of reduction in air emission/pollution.	3.513	0.873
EN2	Extent of reduction in water and solid pollutants	3.667	0.857
EN3	Extent of reduction in hazardous/toxic material	3.872	0.822
EN4	Extent of reduction in environmental complaints	3.923	0.828

EN5	Improvement in environmental - working conditions	3.872	0.822
ENAvg	Environment Performance	3.769	0.697

It was observed the GSCM practice had the greatest effect on environmental performance of the firm by reduction in environmental complaints with a means of 3.923. It had a std dev of 0.828. The second greatest effect was extent of reduction in hazardous material and improvement in environmental working conditions in the firms with means of 3.872. It also had a std dev of 0.822. The construct with the least effect from respondents' feedback was extent of reduction in air emission/pollution with a mean of 3.513. It also had std dev of 0.873. The results showed a grand mean of 3.769 and std dev of 0.697 which showed that GSCM practices' effect on environmental performance was to a great extent.

4.10.2 Economic Performance

Table 4.9 show the results from the returned questionnaires on effects of GSCM practices on their firm's economic performance based on the selected constructs.

Table 4.9 Economic Performance Statistics

		Mean	Std. Dev.
EC1	Reduction in material cost	3.231	1.049
EC2	Reduction in cost of energy consumption	3.026	0.891
EC3	Innovation fostered by GSCM practices	3.436	0.778
EC4	Decreased in cost of disposing waste.	2.795	1.090
EC5	Reduction in fines due to environmental incidents	3.667	0.762
EC6	Increase in revenue	3.051	1.085
EC7	Growth in market share growth	2.923	1.022
EC8	Reduction in cost due to repair and replace.	3.077	0.944
ECAvg	Economic Performance	3.151	0.700

From table 4.9 it was observed the GSCM practice has had the greatest effect on economic performance of the firm by reduction in fines due to environmental incidents with a mean of 3.667 and a std dev of 0.762. The second greatest effect with a mean of 3.231 was extent of reduction in material cost. It also had a std dev of 1.049. The construct with the least effect from respondents' feedback with a mean of 2.795 was extent of decreased in cost of disposing waste. It also had a std dev of 1.090. The results showed a grand mean of 3.151 and std. dev of 0.70 which showed

that GSCM practices' effect on economic performance of the firms was to a moderate extent.

4.10.3 Social Performance

Table 4.10 is a breakdown of analysis of responses on effects of GSCM practices on their firm's social performance based on the selected constructs.

Table 4.10 Social Performance Statistics

	Social Performance Indicators	Mean	Std. Dev.
S1	Customer satisfaction	3.513	0.902
S2	Relationship with surrounding communities	3.564	0.841
S3	Management's commitment to environmental control	3.769	0.799
S4	Employee satisfaction & firms commitment to their welfare	3.949	0.783
S5	Relationship with government and independent agencies	3.923	0.764
SAvg	Social Performance	3.744	0.684
FPAvg	Firm Performance	3.487	0.647

From table 4.10 it was observed the GSCM practice has had the greatest effect on social performance of the firm by increase in employee satisfaction and firm's commitment to their welfare a means of 3.949 and a std. dev of 0.783. The second greatest effect with a mean of 3.923 was extent of improvement in relationship with government and independent agencies. It also had a std dev of 0.764. The construct with the least effect from respondents' feedback with a mean of 3.513 was extent of improvement in customer satisfaction. It also had a standard deviation of 0.902. The results showed a grand mean of 3.487 and std dev of 0.647 which showed that GSCM practices' effect on economic performance of the firms was to a moderate extent.

4.11 Data Analysis

Table 4.11 Firm Performance Overall Statistics

Avg	Firm Performance	3.12	0.52
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The results showed a grand mean of 3.12 which is greater than 2.50 and less than 3.49. Therefore, there is adoption of GSCM practices to a moderate extent among BMC sector firms in Kenya. It also had a grand standard deviation of 0.5233.

Table 4.12 Results of Regression Model

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-.610	.397		-1.537	.134
1 Internal Environment Management	.478	.136	.449	3.515	.001
Green Procurement	-.222	.136	-.263	-1.631	.112
Green Manufacturing	.319	.123	.294	2.584	.014
Green Distribution	.337	.134	.293	2.516	.017
Reverse Logistics	.308	.116	.339	2.652	.012

The regression model was:

$$Y = \alpha_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + e$$

Where Y is Firm performance, X₁ is Green procurement, X₂ is Green Manufacturing, X₃ is Reverse Logistics, X₄ is Internal Environment Management and X₅ is Green Distribution.

Where β_1 , β_2 , β_3 and β_4 are the standardized coefficients (Beta) of X₁, X₂, X₃, X₄ and X₅ respectively, α is the constant of Y-intercept and e is the error.

$$Y = -0.263X_1 + 0.294X_2 + 0.339X_3 + 0.499X_4 + 0.293X_5$$

The results of the model show that four of the independent variables have a positive coefficient while one has a negative coefficient. The regression results show that there is a positive relationship between firm performance and the variables internal environment management, green manufacturing, green distribution and reverse logistics. Green procurement show a negative relationship to firm performance. The results show that, one unit change in implementation of internal environment management results in 0.499 change in firm performance, green manufacturing management results in 0.294 change in firm performance, green distribution management results in 0.293 change in firm performance and reverse logistics management results in 0.399 change in firm performance. While one unit change in green procurement results to 0.263 units decrease in firm performance. However, not

all the variables had a statistically significantly since green procurement had a significance p-value greater than 0.05 at 0.112. According to Nderitu and Ngugi (2014) if one variable p has a value higher than 0.05 but four other variables in the same study have p-values below the 0.05 value then we should reject that specific parameter and proceed with the outcome of the rest of the variables whose p-value are less than 0.05 since one figure is negligible given that the others are statistically significant and can be used to deduce how significant the relationship is.

Table 4.13 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.889 ^a	.790	.758	.32262

The model had an R Squared of 0.889 which show the model fit. Table 4.13 show an adjusted R Square of 0.758 which means 75.8 % of the changes in firm performance could be deduced to be caused by the combined effects of GSCM practices while the remaining 24.2% can be caused by other variables.

Table 4.14 ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	12.930	5	2.586	24.846	.000 ^b
	Residual	3.435	33	.104		
	Total	16.365	38			

Table 4.14 showed a significance value of the model was 0.000 as show I the table above which represents the test results on the whole model. A p value that is below 0.05 mean it can be concluded that GSCM practices effect of firm performance is statistically significant. In addition, it can be deduced there positive correlation exists between GSCM practices and firm performance. The F calculated at 0.05 significance level was 24.846 and since F from the table of critical values for the F distribution, F critical is 2.50 and since F is above F critical the test result are significant at that level of probability.

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter includes the summary of the data findings for the result of effect of adopting GSCM practices on performance of firms for firms in building, mining and construction sector in Kenya. The chapter contains the conclusion, recommendations, and limitations of the study and future areas of research.

5.2 Summary of Results

The finds of the study showed GSCM practices had been adopted to a moderate extent by firms in the BMC sector in Kenya. Internal environment management has been adopted to a great extent. Green procurement, green manufacturing and green distribution have been adopted to a moderate extent while reverse logistics has been adopted to a small extent by firms in BMC sector in Kenya.

On effect of adopting GSCM practices on performance of firms in the BMC sector in Kenya it can be concluded that GSCM practices adoption has an important role in firm performance. This is because there is a positive relationship between firm performance and independent variables (internal environment management, green manufacturing, green distribution and reverse logistics.) However, green procurement has a negative impact on firm performance but the variable is statistically insignificant.

5.3 Conclusions

The findings of the study conclude that manufacturing firms in the BMC sector in Kenya have adopted GSCM practices to a moderate extent. The study show that adoption of GSCM practices is statistically significant in affecting firm performance. This is explained by the positive relationship between the dependent variable (firm performance) and the independent variables (internal environment management, green manufacturing, green distribution and reverse logistics). The study findings concur with similar previous studies as conducted by (Nderitu & Ngugi, 2014; Yang, Chen, Lee, & Cheng, 2023).

5.4 Recommendations

It is recommends that BMC manufacturing firms should adopt green supply chain management practices to positively influence their firm's performance. Among the

GSCM practices internal environment management produced the highest impact of firm performance and it is therefore recommending firms to consider implementing this practice as a first priority. The study also recommends a review of how green procurement is implemented to avoid its adoption having a counterproductive impact on firm performance as shown by the results of the study.

5.5 Limitations of the Study

The accuracy of information collected was dependent on respondent and their organization willingness to provide answers to the questionnaires. Some firms showed resistance to participate and gave reasons of lack of time, confidentiality and nondisclosure policies. The validity and reliability of the information collected in the questionnaire was dependent on the honesty of the respondents.

The study was specific to the BMC firms who are members of KAM. This firms tend to be larger organizations with greater capacity and resources and the findings presented might not be fully representative of the entire sector or industries.

The use of Likert scale questionnaires in data collection might have included the respondent's biases which might be present in the results. Therefore it is likely that if different respondents in the same sample size were used then different results might have been achieved.

5.6 Areas for Future Research

The findings indicate there reverse logistics adoption is to a small extent and a result should be conducted to establish the reasons why manufacturing firms in BMC sector are not adopting reverse logistics. The findings also showed a negative impact of adoption of green procurement and a study should be conducted to establish which practices have resulted in the negative impact and how it can be corrected to ensure firms benefit from the implementation of the practices. Similar studies should be carried out in the energy sector and other industries.

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APPENDICES:

Appendix I: Questionnaire

This questionnaire seeks to engage respondents on information related to GSCM practices and firm performance of BCM Firms in Kenya.

Any information or details provided will remain confidential and for use of academic purpose only.

Kindly ticking the box that best represents the answer for the question given in the appropriate box or provide the appropriate details in the spaces provided.

SECTION ONE: General Respondents Information

1

2. For how many years have you been in the organization?

≤ (less than) 5 yrs <input style="width: 30px;" type="checkbox"/>	5 - 10 yrs <input style="width: 30px;" type="checkbox"/>	10 - 15 yrs <input style="width: 30px;" type="checkbox"/>	≥ (greater than) 15 yrs <input style="width: 30px;" type="checkbox"/>
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6. What is the annual turnover in (Ksh.) of your company?

Up to 50million <input style="width: 30px;" type="checkbox"/>	51M to 1 billion <input style="width: 30px;" type="checkbox"/>	Over 1 billion <input style="width: 30px;" type="checkbox"/>
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SECTION TWO: GSCM Practices

To what extent GSCM is implemented in the firm as per the scale provided. One (1) represents the lowest score of no implementation at all (**not at all**) and implementation extent increases to (5) which represents a very great extent of implementation (**very great extent**)

A	Internal Environment Management (To what extent.....?)	Not at all	Small Extent	Moderate Extent	Great Extent	Very Great Extent
1	The firm's senior managers committed to GSCM practices	1	2	3	4	5
2	The firm mid-level managers supported GSCM practices	1	2	3	4	5
3	The firm's teams responsible for environmental improvements their performance due to GSCM	1	2	3	4	5
4	The firm has total quality in the management of EMSs.	1	2	3	4	5
5	The firm has certificates that show it	1	2	3	4	5

	has complied with environmental auditing requirements.					
6	The firm has an environmental management systems in place	1	2	3	4	5
7	The firm support environment regulations	1	2	3	4	5
B	Green Procurement					
1	The firm suppliers are provided with environmental specifications for items being purchased.	1	2	3	4	5
2	The company had good relations with its customers and its suppliers to enable them meet their green related objectives.	1	2	3	4	5
3	The firm audits its supplier's EMSs.	1	2	3	4	5
4	The firm deals with Suppliers' with Environment Management Systems such as UN EMS or ISO1400 certification.	1	2	3	4	5
5	The firm works closely with suppliers for cleaner production	1	2	3	4	5
6	The firm motivates and cooperates with its suppliers enable them adopt or implement green packaging.	1	2	3	4	5
C	Green Manufacturing					
1	The firm manufactures processes ensure reduced raw material and energy consumption	1	2	3	4	5
2	The firm manufactures its products for to enable recycling or reuse or recovery of material.	1	2	3	4	5
3	The firm operates in such a way as to make products that ensure minimal or complete elimination of use or release of hazardous components.	1	2	3	4	5
4	The firm has designed components or products which have less weight less and that require least production time to decrease the storage area and energy requirement in production.	1	2	3	4	5
5	The firm recycles its internal waste and excess inventory/material after production.	1	2	3	4	5
6	The firm manufactures items while considering ease of setting up and for maximum energy saving.	1	2	3	4	5
7	The firm manufactures products that are durable and that can be easily repaired.	1	2	3	4	5
8	The firm uses renewal sources of	1	2	3	4	5

	energy such as solar, wind, biomass, biogas etc.					
9	The firm recycles its internal waste and excess inventory/material after production or converts its waste to energy for reuse	1	2	3	4	5
D	Green Distribution					
1	The firm distributes its products in bulk rather than in small batches and vehicles always carry full loads for efficiency.	1	2	3	4	5
2	The firm uses the most efficient mode of transport available and uses the least amount of energy.	1	2	3	4	5
3	The firm uses transport methods that produce less pollution (air & noise) such a train and ship as compared to vehicle and plane.	1	2	3	4	5
4	The firm harnesses the power of technology and information systems to manage its supply loading, routing and logistics.	1	2	3	4	5
5	The firm has a distribution network to deliver items to the final customer.	1	2	3	4	5
6	The firm uses alternative energy sources in transport especially Solar powered, biofuels, hydrogen, electric powered, ethanol etc	1	2	3	4	5
7	The firm prioritizes customers who are near to their facility which enable them to reduce energy used to transport.	1	2	3	4	5
8	Where the firms outsources logistics services the firm uses firms which have EMS systems in place such as ISO 14001 or UN EMS.	1	2	3	4	5
9	The firm has an elaborate vehicle maintenance plan to ensure their vehicles remain in good condition for safe and effective operation.	1	2	3	4	5
10	The firm disposes its vehicles once they are old and does not keep them in a garage or parking while they will not be repair to use.	1	2	3	4	5
E	Reverse Logistics Practices					
1	The firm creates awareness to its supplier and customers on its policy for packaging of final product and how to handle any residue or items	1	2	3	4	5

	left after use of its products.					
2	The firm has collection sites/areas for packaging from its products and for customers to return end of life products for reused or recycled.	1	2	3	4	5
3	The firm has outsourced an external party to aggregate waste emanating from its products.	1	2	3	4	5
4	The firm maintains a record of the quantities of packaging it produces and end of life times of its products from end users/customers.	1	2	3	4	5
5	The firm has an incentive program to motivate customers to return its products packaging to the firm or its collection points.	1	2	3	4	5
6	The firm has provided clear details of the environmental information of its products and on how to use, handle and dispose of product or product packaging after use..	1	2	3	4	5
7	The firm has an agreement with its suppliers where it returns its products/items after use and packaging from raw material to suppliers for recycling.	1	2	3	4	5
8	The firm aggregates and sends packaging and used products back in bulk.	1	2	3	4	5
9	The firm has a mechanism on how it monitors the flow of items returning from customers.	1	2	3	4	5
10	The firm has systems that monitor that customer are utilizing its products appropriately.	1	2	3	4	5

SECTION THREE: Firm Performance

Indicate the extent of improvement in the following performance indicators due to implementation on GSCM.

A	Environment Performance	Not at all	Small Extent	Moderate Extent	Great Extent	Very Great Extent
1	Extent of reduction in air emission/pollution.	1	2	3	4	5
2	Extent of reduction in water and solid pollutants	1	2	3	4	5
3	Extent of reduction in organizations use/release of hazardous/harmful/toxic material to	1	2	3	4	5

	environment.					
4	Extent of reduction in environmental complaints from the firm's activities.	1	2	3	4	5
5	Improvement in environmental working conditions of employees	1	2	3	4	5
B	Economic Performance					
1	There is decrease in material cost in the firm.	1	2	3	4	5
2	Extent of reduction in cost of energy consumption in the firm.	1	2	3	4	5
3	Extent of innovation fostered by GSCM practices.	1	2	3	4	5
4	Extent of decreased in cost of disposing waste.	1	2	3	4	5
5	GSCM practices have helped the firm reduces money spent on compensation/fines due to environmental incidences/accidents.	1	2	3	4	5
6	Extent GSCM has increased revenue for the firm.	1	2	3	4	5
7	Extent of market share growth due to GSCM practices implementation.	1	2	3	4	5
8	Reduction in service related cost due to repair and replace.	1	2	3	4	5
C	Social Performance					
1	Extent of improvement in customer satisfaction with product and firms operations.	1	2	3	4	5
2	Extent of improvement in relationship with communities within which the firm operates.	1	2	3	4	5
3	Extent of improvement in firm's management has committed to improve environmental controls.	1	2	3	4	5
4	Extent of improvement in employee satisfaction and firms commitment to their welfare	1	2	3	4	5
5	Extent of improvement in relationship with government and independent agencies	1	2	3	4	5

Appendix 2: KAM list of BMC sector firms

BUILDING AND CONSTRUCTION ACCESSORIES	
S/No	Name
1	ARISTOCRATS CONCRETE LIMITED
2	BOYAMA BUILDING MATERIALS
3	CEMEX HOLDING LTD
4	DITTMAN CONSTRUCTION CO. LTD
5	ELEGANT FITTINGS LIMITED
6	ERDEMANN GYPSUM LIMITED
7	EUROCON TILES PRODUCTS LTD
8	GJENGE MAKERS LIMITED
9	HYDRO WATER WELL (K) LIMITED
10	INTERNATIONAL GREEN STRUCTURES MANUFACTURING LTD (KENYA)
11	KEDA CERAMICS COMPANY LTD (KENYA)
12	KENBRO INDUSTRIES LTD
13	KENYA BUILDERS & CONCRETE LTD
14	KOTO HOUSING KENYA LTD
15	LAXMANBHAI CONSTRUCTION LIMITED
16	LEXCON ENTERPRISES LTD
17	MINERAL ENTERPRISES LTD
18	QUESTWORKS LIMITED

19	REXE ROOFING PRODUCTS
20	ROOFINGS KENYA LIMITED
21	SAJ CERAMICS LTD
22	SKYLARK CONSTRUCTION LTD
23	SPACE AND STYLE LTD
24	TILE & CARPET CENTRE
25	WOTECH KENYA LIMITED
	CEMENT PRODUCTION
S/No	Name
26	BCL- BAMBURI CEMENT PLC
27	EAPCCL - EAST AFRICAN PORTLAND CEMENT COMPANY LTD
28	KARSAN RAMJI AND SONS LIMITED
29	MOMBASA CEMENT LTD
30	NATIONAL CEMENT LIMITED
31	RAI CEMENT LIMITED
32	SAVANNAH CEMENT LTD
	MINING & QUARRYING
S/No	Name
33	AFRIKSTONES LIMITED
34	AFRICAN DIATOMITE INDUSTRIES
35	BLUE STONE LIMITED
36	COAST CALCIUM LIMITED
37	ELDORET QUARRY LIMITED
38	HALAI CONCRETE QUARRIES
39	HOMA LIME CO. LTD
40	KAY CONSTRUCTION COMPANY LTD
41	SHAJANAND CREATIVE LIMITESD

42	SILVERSTONE QUARRY LIMITED
43	SUPERSTONE 2006 LTD
44	TIPTOP CONSTRUCTIONS LIMITED
45	VALLEM CONSTRUCTION LTD
46	VIRJI VISHRAM PATEL & SON'S LTD

PRECAST AND READY-MIX CONCRETE	
S/No	Name
47	ORBIT ENTERPRISES LTD
48	NORTH RIFT CONCRETE WORKS LTD
49	BAMBURI SPECIAL PRODUCTS LTD
50	RELIABLE CONCRETE WORKS LTD
51	COMPACT POLES & SERVICES LTD
52	GREYSTONE INDUSTRIES LIMITED
53	KISUMU CONCRETE PRODUCTS
54	PRIDE ENTERPRISES LTD

Appendix 3: Letter of data collection



**UNIVERSITY OF NAIROBI
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6th November 2022

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

**RE: INTRODUCTORY LETTER FOR RESEARCH
WAITHAKA WILLIAM MWANGI – REGISTRATION NUMBER - D61/10644/2018**

The above named is a registered Master of Business Administration (MBA) student at the University of Nairobi, Faculty of Business and Management Sciences. He is conducting a research on "*Effect of Adopting Green Supply Chain Management Practices on Performance of Manufacturing Firms: The Case of Building, Mining and Construction Sector in Kenya*".

The purpose of this letter is to kindly request you to assist and facilitate the student with necessary data which forms an integral part of the research project. The information and data required is needed for academic purposes only and will be treated in **Strict-Confidence**.

Your co-operation will be highly appreciated.

Thank you

A handwritten signature in black ink, appearing to read 'Dr. Mwanyota Job Lewela'.

Dr. Mwanyota Job Lewela
Lecturer,
Department of Management Science and Project Planning,
Faculty of Business and Management Sciences.