

**GREEN SUPPLY CHAIN MANAGEMENT PRACTICES, INFORMATION
SHARING AND PERFORMANCE OF MANUFACTURING FIRMS IN
NAIROBI COUNTY, KENYA**

**BY
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**A Research Thesis Submitted to the Department of Marketing and Logistics,
School of Business and Economics in Partial Fulfilment of the Requirements for
the Award of the Degree of Masters in Logistics and Supplies**

Moi University

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DECLARATION

Declaration by the Candidate

I declare that this thesis is my original work and has not been presented to any other institution. No part of this thesis may be replicated without prior or express sanction of the author and or Moi University.

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DEDICATION

I dedicate this work to my family members, friends and relatives for the assist and ample environment to partake of this proposal. I will like also to dedicate this Masters in Logistics and Supplies research to the department of management science, Moi University. There is no distract in my consent that without their utmost counsel and support I could not have accomplished this task.

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ABSTRACT

Manufacturing firms in Nairobi County perform poorly which could be as a result of poor integration of green practices in the supply chain activities as a means of ensuring better performance. Despite the efforts made by manufacturing firms to attain firm performance, they face numerous challenges, which inhibit them from implementing green practices this includes general challenges that affect the implementation of green practices amongst manufacturing firms. These challenges include; firm barriers which involves weak firm structures, poor employee empowerment, internal politics, inadequate skills and underdeveloped green practice culture. Environmental knowledge barrier; which involves inadequate access to green practice knowledge and expertise. Business environment challenges, which involve inadequate market, inadequate green practices measures, and distortion of verifiers of green practices. Supply barriers involve poor supply commitment to green practices and difficulties in obtaining information on materials. The study's purpose is to determine the moderating effect of information sharing on the relationship between green supply chain management practices and performance of manufacturing firms in Nairobi County, Kenya. Its specific objectives are to determine the effects of green manufacturing, green packaging, and green purchasing on the performance of manufacturing firms in Nairobi County, Kenya, while moderating each relationship with information sharing. The study was guided by the resource-based view theory, ecological modernization theory, and sustainability theory. The explanatory research design was applicable to the study. The target population for this study was six hundred and fifty (650) manufacturing firms in Nairobi County, Kenya clustered into different sectors depending on their nature of production activities. The sample size of the study was 242 firms. The unit of inquiry was purchasing or logistics managers of the firms registered with the Kenya Association of Manufacturers (KAM 2021). A stratified sampling technique was applied in the study. The data collection tool was a structured questionnaire where data was obtained from purchasing or logistics managers in the procurement departments. Data was analysed using descriptive and inferential statistics with the help of SPSS version 24. Descriptive statistics involves standard deviation and mean, while inferential statistics includes Pearson correlation and multiple regression analyses. The study results were presented using tables. The findings revealed that green manufacturing ($\beta = 0.244$, $p=000<0.05$), green packaging ($\beta = 0.156$, $p=004<0.05$), and green purchasing ($\beta = 0.572$, $p=000<0.05$) positively and significantly affect the performance of manufacturing firms in Nairobi County, Kenya. Besides, information sharing positively moderates the relationship between green manufacturing and firm performance ($\beta = 0.42$, $R^2\Delta = 0.109$, $p=000<0.05$), green packaging and firm performance ($\beta = 0.34$, $R^2\Delta = 0.059$, $p=000<0.05$) and green purchasing and firm performance ($\beta = 0.65$, $R^2\Delta = 0.069$, $p=000<0.05$). The study, therefore concludes that green manufacturing, green packaging, and green purchasing positively affect firm performance, with information sharing being a vital factor. It is recommended that manufacturing firms in Nairobi County should prioritize green manufacturing, green packaging, and green purchasing practices to enhance performance. Emphasis should be placed on collaboration, the use of eco-friendly materials, and transparent communication mechanisms to achieve sustainable growth, a competitive edge, and responsible business environments.

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ABBREVIATIONS AND ACRONYMS

BSC	-	Balance Scorecard
DV	-	Dependent Variable
EBIT	-	Earnings before Interest and Tax
ECD	-	Environmental Conscious Design
ERC	-	Energy Regulatory Commission
EVA	-	Economic Value Added
GD	-	Green Distribution
GSCM	-	Green Supply Chain Management
IV	-	Independent Variable
KAM	-	Kenya Association of Manufactures
LCA	-	Life Cycle Assessment Analysis
NEMA	-	National Environmental Management Authority
PPWD	-	Packaging and Packaging Waste Directive
ROI	-	Return on Investment
ROS	-	Return on Sales
SCA	-	Sustainable Competitive Advantage

OPERATIONAL DEFINITION OF TERMS

Firm performance	entails the substantive results or output as determined against its intended yield (Bedi, 2019).
Green manufacturing	is a strategy that requires the firm whether small or large to figure out what should be conducted in relation to its negative environmental effects that results to increases in cost, reduces productivity and results to efficiency reduction.
Green packaging	as a packaging linked eco-design and it is an vital element of green supply chain management practices, it involves the use of non-hazardous packaging component, use of re-usable packaging component, recyclable packaging, use of biodegradable packaging component and embracing the reduced size packaging to minimize distribution cost, enabling better utilization of shelf space and minimize carbon footprint (Ouyang, 2014).
Green purchasing	as a resource buying that pursues to enable recruitment materials achieve environmentally needs of the firms (Khan and Qianli, 2017),

Green supply chain management is a process of merging environmentally-friendly capabilities into every aspect of supply chain which entails manufacturing, packaging, product development and design, distribution, warehousing, retrieval, disposal, and subsequent post sales services entailing end of product life management (Seok-Beom ; Choi et al, 2017).

Green supply chain is an approach which integrates management of environmentally manufactured materials, green purchasing and reverse logistics (Hassan et al, 2016).

Information sharing encompasses the transfers of proprietary information and crucial information within supply chain partners (Li et al., 2005).

CHAPTER ONE

INTRODUCTION

1.0 Overview

This chapter presents background of the study, history of manufacturing firms, statement of the problem, research objectives, research hypothesis, significance of the study and scope of the study.

1.1 Background of the Study

In today's highly dynamic environment, organizations strive to improve their firm performance to encounter the speed of change in technological advancement, customer demands and global competition. Attaining a sustainable firm's performance to enable long term survival is a major aim for managers in every organization. Nevertheless, the smaller firms have major problems surviving under hostile environmental conditions than larger firms (Hosseini et al., 2018). Firms can boon from innovation strategies as it enhances the companies to optimize their competing power by increasing their performance and efficiency in terms of its operations (Goksoy, 2013). Apparently, firms can achieve the possible performance by creating more economic value compared to the marginal (break-even) of the competitors (Angus and Nellis, 2019).

Huang et al., (2020) expounds that the objective of green supply chain management (GSCM,) is actually to reduce damages to resources, capabilities and the environs with which businesses transact, and in relation to the supply chain while engaging economic interests for the purpose of attaining the substantial development element of the public.

Several researchers in developed countries for instance Europe (Otago 2009; Muruli, 2008; Zailani et. al., 2012; Das, 2018), have reinforced the claim that green practices positively influences the firm performances. In Africa manufacturing sectors are putting

more emphasis on the supply chain practices undertakings which offer optimum performances on income, time, used for manufacture and the value of the manufactured goods or services. The problem has changed from “whether” to “how” to incorporate social, environmental and economic effects of green supply chain management into daily managing choices when executives at all heights have substantial motivational pressures to enhance short- term incomes (Mani, et al., 2016). Majority of firms have full-fledged on undertakings on the supply chain but are thoughtful further so as to enhance the effect of greening.

Kenya in particular is an industrialized position economy which is fronted and buzzed with difficult issues in industrial enterprise development. Attempts by associates including, National chamber of commerce and industry, Kenya association of manufactures and private sector and also the government have not revamped. Manufacturing firms in Kenya have been less competitive vis-a-vis competition from other manufacturing firms across the globe (World Bank, 2017). Manufacturing firms have been closed due to their inability to compete in a current competitive market. According to Love, (2011) and Mbalwa et al., (2014), industries and firms in this category encounter poor industry policies, issues of risk management, challenges of regulation, resource limitations, divulged and stiff competition from cheap imports and industrial multi practices. The buyer characteristics is dynamic ever. Majority of manufacturing firms have shut down their undertakings, while a number of them resorting to green pastures like other nations. Motives of suppressing and restraining from the influences of dependency on agriculture, therefore the government has put in place mechanisms towards attainment of industrialization by the year 2030. In Kenya, manufacturing sector has contributed to 11% of GDP for the last decennium, which is an indicator that it has dragged down (GOK 2018). Economy of Kenya is evolving

from agriculture-based economy leaning towards middle income and industrial economy. Therefore, to attain this target, manufacturing sector is required to increase GDP share contribution (GoK; 2020). Achievement of manufacturing sectors in conjunction to supply chain practices is demanding. For instance, manufactures of plastic bags face poor performance as a result of the ban on plastics in August of 2007. The ban of the plastics industry which is linked to environmentally supply chain management practices resulted to a negative influence on the sector resulting to a decrease in the totality of plastic yield by a margin of 3.8 % in the year 2007. Regulation and policy (KAM, 2021), uncertainty has resulted to a closure of nearly 40 firms as a result of the pronounced and ban version to capital expenditure and investment in the sector. On contrary, a small number of researchers have backed up the contrasting assertion that there is an adverse association of sustainable programs on firm performance.

Green supply chain management, according to Seok-Beom ; Choi et al., (2017), green supply chain management is a process of merging environmentally-friendly capabilities into every aspect of supply chain which entails manufacturing, packaging, product development and design, distribution, warehousing, retrieval, disposal, and subsequent post sales services entailing end of product life management. However, green supply chain implementation has become tremendous, gigantic issue over a couple of years, and therefore variety of companies nowadays tries to focus on implementing and adopting green practices to achieve end-to-end processes for the sole purpose of reducing the customers and government pressures (Theye, 2021). This green supply management practices includes;

Green manufacturing, according to Seith et al., (2018) and Abdul-Rashid et al., (2017), green manufacturing is a strategy that requires the firm whether small or large to figure

out what should be conducted in relation to its negative environmental effects that results to increases in cost, reduces productivity and results to efficiency reduction.

Green packaging, Ouyang (2014) defines green packaging as a packaging linked eco-design and it is an vital element of green supply chain management practices, it involves the use of non-hazardous packaging component, use of re-usable packaging component, recyclable packaging, use of biodegradable packaging component and embracing the reduced size packaging to minimize distribution cost, enabling better utilization of shelf space and minimize carbon footprint.

Green purchasing, Khan and Qianli (2017), defines green purchasing as a resource buying that pursue to enable recruitment materials achieve environmentally needs of the firms. Green purchasing according to Carter and Carter (1998), involves interaction of sourcing-reduction and recycling undertakings in the supply chain management while Galle and Min (2001), defined green purchasing as minimizing sources of waste by enabling recycling undertakings without interrupting the system. Foo et al., (2019), stated that environmental green purchasing is attained through various procedures which includes, programs and purchasing regulations. Hence, green purchasing guarantees purchased components and materials attain eco-friendly characteristics which includes reusability, recyclability. Unal and Shao (2009), stated supplier interaction is a key element towards attaining green purchasing. Integrating green philosophy in purchasing concept enables firms to bring forth design specifications to suppliers which must include, green purchasing environmental determinants.

Gunasekaran et al., (2004). Stated that, business competition nowadays is eminent between supply chains of firms. According to Archer et al., (2016) stipulated that information sharing is a key element influencing firm supply chain performance.

Contrary, Benton and Zhou (2007) postulated that information sharing is crucial within the supply chain since performance of a firm is fostered as a resultant of efficient information sharing. Bullwhip effect is a product of lack of adequate information sharing within a firm Lee et al., (1997). Towill and Disney (2003), stated that bullwhip effect is a condition in which orders to retailers fluctuates more as compared to sales to consumers. As a result of distorted information flow in an amplified configuration within the supply chain it triggers the upstream move within the supply (Disney & Towill, 2003).

According to Dubey et al., (2018), stated that information sharing effects positively as it fosters alignment and adaptability and also improves on the level of visibility in manufacturing firms, hence securing and managing information within supply chain is a crucial aspect achievement in regards to the evolving business environment. Firm performance goals can be attained through proper environmentally managed information sharing between customers and suppliers and also supply chain partners. (Yang et al., 2016; Jabbour, 2015). According to Khan et al., (2016), firm performance element can be achieved by converting and activating green processes and practices within the firms through information system platform. Sanchez-Rodriguez et al., (2005), stated that logistics costs and customer satisfaction can be reduced when proper and right information between retailers and consumers are attained. Other empirical studies for instance, Sako (2004), argued that the higher the level of information sharing, the lower the inventory levels hence customer satisfaction. Bullwhip effect is as a result of uncertain information sharing that alters the entire supply chain negatively, therefore the essential factor for improving supply chain performance is the efficient information sharing.

Firm performance and competitiveness in the market is achieved when proper and right information sharing within supply chain is taken into account. Several studies on

information sharing on firm performance have been done for instance Takizawa & Aoki (2002) suggested two agencies which information sharing can revamp firm performance. Firstly, improving firm performance and attaining competitive advantage in the market place is a detrimental consequence of information sharing within the firm, secondly coordinating the retailers and consumers future programs.

El-Kassar, 2019; Singh ; Rezaei et al., (2017) argued that in this reign of manufacturing and production sector divulge preferences of primary and integrated information and subsequent communication and information technologies are accessible for firms to foster decision making by real time information. While Bag et al., (2020), articulated that information sharing across and within the verticals of supply chain and supply chain undertakings have improved due to the deployment of intelligent technologies and instrumentation which includes; RFID sensors and tags, PLC, SCADA, ERP, HMI, vehicular ad-hoc networks, global positioning systems, smart mobile devices, shelf robots, warehousing management systems, automated guide vehicles. Wilhelm-Gerhard and Lotero-Ersoz (2019), proposed that positive impact of firm performance is realized through implementing green supply chain management practices, therefore firms should boost and improve on green practices towards redressing issues of environmental in their supply chain. Several proponents for instance Fugate et al., (2016), propounds that purchasing and logistics officers encounter weighty problems towards attainment of ease and interest of green supply chain practices, hence prompting implementation hurdles (Kumar & Goyal, 2017).

The essence of this research tries to figure out the green supply chain management practices and firm performance relationship while factoring in information sharing as a moderating variable, which is an avenue which is significant in advancing and strengthening the robustness of green supply chain management, (Klaue & Marksmen,

2016). The cornerstone of this research is to manage problems emanating from manufacturing firms. Firm performance can be realized when firms actualize green practices in the supply chain management factoring in information sharing, hence, long-established supply chain management (SCM) requires enhancement and development to enabled current blueprints heartening supply chain and logistics officers to render bygone supply chain positioning brand new ones.

1.1.1 History of manufacturing firms in Kenya

Evolution of industrial development in Kenya emanates from composite amalgamation of framework economy policy, situation of macro-economy, ancient effects and international ecology that it harness and run. In this perspective, strategies and programmes peculiarly demeanour on entrepreneurship, financial intermediation, infrastructure and technology. Manufacturing sector in the Kenyan context has attained substantial achievement after independence. In spite of deliberate growth in the 1980's. Performance of manufacturing sectors in Kenya for the fifteen years since independence proved remarkable as eminent in statistics predominantly in statistical and economic surveys. Gross Net Product increase at annual rate of 8.9% beyond 1966-1972, reestablishment manufacturing of Asian citizens commanding entrepreneurial knowledge and protection of large venture capitalist were also the resultant determining factors. In 1980-1984, the growth in manufacturing sector dropt at a significant rate of 4% per year, ascending to a slight average of 5% between the years 1985-1990.

State involvement and engagement towards manufacturing and industrial has played significant factor in manufacturing sector, enabling equity participation through parastatals instituted for purpose specific or implicated by treasury. Parastatals sector has broaden between the year 1970's and 1980's as evident in the 1982 documentation of state working agency, the totality of parastatals were 245 out of these parastatals 28%

totally owned by state and 45% jointly owned by the state. These parastatals includes, Industrial development bank, Development finance company of Kenya, Commercial and industrial development corporation and other foundations liberating and coordinating industrialization including, Kenya development research institute, Kenya bureau of standards and Kenya industrial estates. The agencies participates in loggerheads largely in various sectors of the economy including, manufacturing sector, agricultural sector, transportation sector and energy. Privatization is derivative of amplification of state involvement in industry and private sector.

The drop in Gross domestic product (GDP) in the last fifteen years in Kenya is eminent from catastrophic challenges which has prompt fear of deindustrialisation premature episode. Over the decades, manufacturing sector has felt minimal swifts in spite of state approach trying to overturn. The gross domestic product (GDP) in the sector of manufacturing is dominant with slightly improvement in the few years averaging with 10% since 1964-1973 and ascending to 13.6% from the year 1990-2007 and stagnating below 10% during the previous years. Manufacturing sector production is rooted towards consumer based. Manufacturing sectors over the last ten years has experienced deviation in production which has been outstanding in spite the passive forces in the manufacturing sector in relation to economic role.

The government of Kenya regulation towards manufacturing sector has not been achieved and its eminent in its undertakings which is geared towards service sector and agricultural based sector, the economy has endured impetuous deindustrialization manifest in gross domestic product (GDP) decrease in the sector of manufacturing evidenced in 9.2% in the year 2016 and 8.4 during the subsequent year 2017. Service sector has contributed significantly to industrialization characterized by increase in gross domestic product (GDP) hence, striking a conversation as to whether

manufacturing sector substitutes service sector as a cornerstone of industrialization. In spite enormous discussions, the sector of manufacturing still remains a very significant blueprint for economies which includes Kenya which strives to attain its industrialization. Hence, resulting to significant policy preference for Kenya state evidenced through presumed mediation geared towards manufacturing sector initiated in the prior years. The big 4 agenda, Industrial transformation programme, and the giant 2030 vision programme developed and yet to be adopted by the state to refurbish and modernise the sector of manufacturing as evidenced with medium plan 3 postulation note, and subsequent decrease and low shares in industrial and manufacturing not outshining the exporting sectors since it contributes to gross domestic product, thus improving the base of Kenyan sector of manufacturing.

1.2 Statement of the Problem

Objectives of firms as suggested by resource -Advantage Theory is to attain superior firm performance (Juarez-Luiz, 2019). Manufacturing firms in Nairobi County perform poorly which could be as a result of poor integration of green practices in the supply chain activities as a means of ensuring better performance. Despite the efforts made by manufacturing firms to attain firm performance, they face numerous challenges, (Bhanot, Rao & Deshmukh, 2015; Ghazilla, Sakundarini, Rashid, Ayub & Olungu (2015), which inhibit them from implementing green practices this includes general challenges that affect the implementation of green practices amongst manufacturing firms. These challenges includes; firm barriers which involves weak firm structures, poor employee empowerment, internal politics, inadequate skills and underdeveloped green practice culture. Environmental knowledge barrier; which involves inadequate access to green practice knowledge and expertise. Business environment challenges, which involve inadequate market,

inadequate green practices measures, distortion of verifiers of green practices (Bhanot, et al., 2015; Ghazilla et.al., 2013; Fore & Mbohwa, 2017). Supply barriers involves poor supply commitment to green practices, difficulties obtaining information on materials and maintaining awareness on green practices will also affect performances of the firm.

Green et al., (2012), advocated that firms in the manufacturing sectors are adversely embracing while enacting and executing green practice management contrary in relation with government and consumers for eco- friendly requirements. According to Kirchhoff et al., (2016), green supply chain management executions accompany adverse and divulge prospective advantages to a firm for instance, economic benefits, differentiation, effectiveness, increase reputation, revenue growth and efficiency. Manufacturing sector in the Kenyan context has been limping in relation to other sectors as evidenced from Kenya national bureau of statistics (KNBS, 2016), 3.5 % growth rate in manufacturing sector with 4.4% in agriculture, 7.2% transport, energy 6.5% and building 9.2%. The sluggish improvements in performances can be due to waste prevalent in overall supply chain and heightened costs of operations that needs to be redressed through greening mechanisms in place.

This research identified GSCM practices (green manufacturing, green packaging, and green purchasing) with the aim of investigating the effects on firm performance. According to Dubey et al, (2018), he define information sharing has improving visibility levels in manufacturing firms by influencing capability and also enriching supply chain agility, alignment and adaptability. Regulating information and integrating to achieve performance of a firm is a crucial achievements considering this hostile ecology. Yang and Zhang 2016; Jabbour (2015), articulated that eco-information

management sharing with customers, supply chain proponents and suppliers yields firm performances and cost advantages.

Several empirical studies appertaining to performances of the firms and green supply chain practices have been undertaken, for instance a study in Asia, Zhu et al., (2005) on different manufacturing industries, identified that regulatory and marketing pressures have pushed firms to improve their eco-friendly awareness. According to Zhu and Sarkis, (2006), put forth that increasing pressure from divulge dimensions have enable the Chinese automobile industry to come up with green practices to boost the eco- firm performances.

In Africa, pressure as accrued to firms to run their undertakings responsibly for instance a study conducted in South Africa by Mafini and Epoh (2018) stated that green management practices which includes, green manufacturing, green packaging and green purchasing improves positively to firm performances and environmental performance. In East Africa particularly, research studies have been undertaken for instance Odock; et al., (2016) identified firm performance and green supply chain management practices of Certified manufacturing firms in East Africa his findings indicated positive correlation between firm performance and green supply chain management practices. Advanced consciousness and acknowledgment on ecological sustainability predicaments, manufacturing firms nowadays fancy and undertake green.

The gap of this study is based on moderating relationship information sharing and firm performance. Prior studies on the relationship between green supply chain management practices and firm performance were done and disregarded moderating factor relationship, therefore, it's of essence to examine and explore research gap from existing literature by establishing the moderating effect relationship of information

sharing on the relationship between green supply chain management practices and firm performance from developing economies perspective such as Kenya economy.

1.3 Objectives of the Study

The study was guided by the following general and specific objectives:

1.3.1 General Objective

The main aim of this study is to establish the moderating effect of information sharing on the relationship between green supply chain management practices and performance of manufacturing firms in Nairobi County, Kenya.

1.3.2 Specific objective

- 1) To determine the effect of green manufacturing on performance of manufacturing firms in Nairobi County, Kenya.
- 2) To analyse the effect of green packaging on performance of manufacturing firms in Nairobi county, Kenya
- 3) To access the effect of green purchasing on performance of manufacturing firms in Nairobi county, Kenya
- 4) To examine the moderating effect of information sharing on relationship between:
 - 4a) Green manufacturing and performance of manufacturing firms in Nairobi County, Kenya
 - 4b) Green packaging and performance of manufacturing firms in Nairobi County, Kenya
 - 4c) Green purchasing and performance of manufacturing firms in Nairobi County, Kenya

1.4 Research Hypotheses

H₀₁: Green manufacturing has no significant effect on performance of manufacturing firms in Nairobi County, Kenya

H₀₂: Green packaging has no significant effect on performance of manufacturing firms in Nairobi County, Kenya

H₀₃: Green purchasing has no significant effect on performance of manufacturing firms in Nairobi County, Kenya

H₀₄: Information sharing has no moderating effect on the relationship between:

H_{04a}: Green manufacturing and performance of manufacturing firms in Nairobi County, Kenya

H_{04b}: Green packaging and performance of manufacturing firms in Nairobi County, Kenya

H_{04c}: Green purchasing and performance of manufacturing firms in Nairobi County, Kenya

1.5 Significance of the Study

The main aim of this research study is to establish moderating effect of information sharing on the relationship between green supply chain management practices and performance of manufacturing firms in Nairobi County, Kenya.

To the Kenya association of manufacturers. Firms in manufacturing Sectors would learn green supply chain management practices as a crucial activity in accessing and appraising ecological economic achievements. They would obtain relevant information relating to pressures, practices and how adoption of green practices in the firm effects firm performance.

To the academicians and researchers. The infancy of green supply chain management practices is still evident by persistent lack of pertinent and requisite knowledge. However the study intends to bring forth in unknown information and knowledge in any manufacturing industry that would be of essence in enabling further understanding of green supply chain management. Whilst academic point of view, the research would fill the gap found in previous studies. It would also open the new horizons for the upcoming researchers to think about firm performance in a new perspective.

To the government. This research study would play a crucial role in regulating environmental policies in the manufacturing industry through variety of regulatory bodies which includes National environmental management authority (NEMA) and Energy regulatory authority (ERC). Also the research would be of significance to various stakeholders which includes; ministry of trade and industrialization, ministry of agriculture and livestock, ministry of national treasury and planning not foregoing other state institutions such as Kenya institute of public policy research and research (KIPPRA), Kenya bureau of standards, Kenya association of manufacturers, and Kenya bureau of statistics.

Strategic investors. The research study would be of significance to strategic investors to acknowledge exhibition and good moment to do financing, since they are the one responsible for providing financial support to green supply chain management in their firms. Understanding the green supply chain management practices implementation by investors should be paramount since it triggers ecological and economy benefits in due course.

1.6 Scope of the Study

The main aim of this study is to establish the moderating effect of information sharing on the relationship between green supply chain management practices and performance of manufacturing firms in Nairobi County, Kenya. The independent variables were green manufacturing, green packaging and green purchasing, the moderator was information sharing, whereas the dependent variable was firm performance. This research study was carried out in manufacturing firms in Nairobi County, Kenya registered with KAM, 2021 and it covered a period between November 2022 and August 2023. The study was conducted in purchasing and logistics departments of the manufacturing firms in Nairobi County, Kenya.

The unit of analysis for the research study was 242 manufacturing firms in Nairobi County, Kenya. Respondent were picked in each firm (one respondent) and the respondent was either logistics managers or purchasing managers from logistics department or supply chain department since they had sufficient knowledge on matters appertaining to logistics and supply chain management.

CHAPTER TWO

LITERATURE REVIEW

2.1 Overview

This chapter tries to examine the literature that figure out the concept of green supply chain management practices. It examines green supply chain management practice concept implementation in firms by various scholars and researchers it focuses on concept of variables, theoretical review, empirical review, conceptual framework and research gap.

2.2 Concept of Firm Performance

Firm performance, according to Bedi (2019), entails the substantive results or output as determined against its intended yield. Richard et al; (2009), articulated that this trilogy is commonly applied as a dependent variable in diverge speciality. While Richards et al., (2009) stated that firm performance is problem relevant leaning towards researchers and lack of agreements detrimental from inadequate consciousness. Further, Glick et al., (2005) anticipated that diverge empirical studies measure firm performance by a single indicator and representing this philosophy as a one dimensional in respective of multi dimensionality nature of firm performance. Whilst, adopting dimensions which are significant to the study and bares outcomes of the choices should be a priority aspect to researchers Richard et al., (2009). According to Kirby (2019), he postulated that performance of manufacturing firms are dynamic nowadays attributed by stiff competition prevalent in the surroundings from both indirect and direct competitors.

The study used marketing indicators to measure firm performance for instance, sales growth (Bulte & Day, 2002; Jayachandran et al, 2005; Yim et al., 2004), customer retention and loyalty, customer satisfaction Abdulateef et al; (2010). Subjective measures will be employed in this research. Subjective measure of performance will be

applicable in this research study contrary to objective measure of performance since subjective measure of performance is anchored on a scale ranging from “strongly disagree” to Strongly agree. While for objective measure is pinned on a definite percentage figure for profitability and sales growth. According to a study by Kohli and Jaworski (1996), pinned down that overreliance on measures of subjective is impediment to date whereas Dawes (1999) stated that subjective measures of performance extensively applied in research studies on market orientation.

According to a study done by Gengeswari et al., (2013), opined that managers unwillingness to reveal performance of the actual information or data bearing the nature of sensitivity or confidentiality, also profitability measures of firm performance may not pinned down the financial health positioning of a firm and lastly Dawes (1999) stated that a strong correlation exists between subjective measures and objective measures.

Non- financial and financial performance is another distinguishing feature of firm performance. According to Strouhal et al., 2018; Aydiner et al., 2019; Pekkola et al., (2016) opined that KPIS accounting system is used to measure financial performance such performance indicators includes return on investment (ROI), return on equity (ROE), return on asset (ROA), return on sales (ROS), earnings before interest and tax (EBIT) and economic valued added (EVA). Smith-Langfield & Chenhall stated that general availability feature is the benefits of these measures of firm performance because each profit maximizing firm provides figures for annual financial reporting. Non-financial performance is a measure of any quantitative information or data about the firm which is not defined in a monetary unit (Dikolli, 2010). Firms are required to analyse and evaluate quantitative results and making justifications as to whether performance is satisfied or not contrary to obtaining quantitate information in monetary

value perspective. Qualitative information has been widely adopted by many firms as a prerequisite of improving performance portfolios. Hence, up front indicators of future measurement performance is the non- financial performance measures which includes, employee or customer satisfaction measures, market share, new product development and customer loyalty.

Firm performance can also be measured by non- financial measures which includes, employee satisfaction and customer loyalty (David & Christopher, 2003). Where the firm brags from the best performance therefore it's the resultant of employee and customer loyalty prevalent from firm satisfaction from services and products. Firms will attain customer satisfaction when the subsequent undertakings cares the needs for the customer. According to a study by Okibo and Daniel (2014), they opined that markets and product development and also employees growth is another indicators of measuring the firm non- financial performance. Increasing firm performance therefore, requires the ultimate attention of firms to explore new horizons and markets or bring forth new services or products on board.

Several empirical studies utilize self-reported measures of firm performance to implement performance for instance, (Henri, 2006; Evans, 2004), while Guilding and Cadez (2008) stated that some merge and amalgamate self- reported and accounted financial systems measures while reporting. This study therefore will employ non- financial measures of firm performance since market share and growth, customer loyalty and customer satisfaction is a measurement indicators for measuring performance (Al- Matari et al, 2014).

2.3 Concept of Green Supply Chain Management Practices

Significance nature of green supply chain management (GSCM) has been developing since. Many firms are employing green supply chain management practices for ultimate goal of competitive advantage and also brand loyalty. According to Jasneet et al., (2018), green supply chain practices includes, green manufacturing, green packaging and green purchasing.

Popularity of supply chain management practices is rooted to 1970s, as many decades passed the influence of green management practices drove the awareness and attention of nearly all parties in such a way that every firm had to dwelled on the perspective of greening irrespective of its nature and size, enabling firms to integrate green initiatives into their scheme of strategic plans Jasneet et al., (2017). Framework of green supply chain includes enactment of green initiatives prevalent at different cycles of supply chain which includes, manufacturing, product design, sourcing, distribution and product recovery.

According to Huang et al., (2020), the ultimate objective of green supply chain management practices is actually diminishing damage to ecology and resources in which firms dwell on, putting forth supply chain while hounding up economic benefits for the purpose of meeting the requirements of the parties. According to Seok-Beom & Choi et al., (2017), green supply chain management is a process of merging environmentally-friendly capabilities into every aspect of supply chain which entails manufacturing, packaging, product development and design, distribution, warehousing, retrieval, disposal, and subsequent post sales services entailing end of product life management. Successful adoption of green practices in firms is position on merge and mix of green practices (Kim & Min, 2012). The common and significant green supply chain management practices includes, tangible practices (hard practices/ technical

practices) including green manufacturing, green packaging and green purchasing (Yang et al., 2022; Miao et al., 2022). Significance of progressing and advancing towards green is attainable by enabling initiatives of green supply chain management practices. While according to Adebayo et al., 2021; Razzaq et al., (2021), non-technical green supply chain management practices including, customer involvement, supplier involvement and management support have been disregarded by firms of developed countries such as Brazil and India

Significance of this intangible practices has not been fully identified, however there is still a gap bearing on this practices as to how this practices impacts firm performance. (Dubey et al., 2017; Annuar et al., 2022). Green supply chain management practices is immensely recognised and more so it has been adopted in developed economies whilst in Kenya, particularly green supply chain management practices is an emerging and infant philosophy and its primary staged. The catastrophic predicaments impeding firms to implement green supply chain management practices includes, social pressures and environmental problems. The inadequacy of green supply chain management practices in the sector of manufacturing is triggered by inadequate research appertaining to green supply chain management practices and firm performance in developing countries including Kenya. Najmi et al., (2020), postulated that Kenya is enduring from complications of ecology majorly from varied climatic changes, industrial waste, limited clean water and deforestation.

2.4 Theoretical Review

It examines the theories that help to surpass understanding of the study whereas broadening rationale for the correct study. These are theories underpinning the study and are significant and guide the area of study.

2.4.1 Resource- Based View Theory

This theory brings forth a conceptual framework to strategically access the fitness of resources. Birger Wernerfelt (1994) was a first proponent of this theory, it was later enhanced by Barney B, 1991 with also other proponents advancing the theory. Barney, 1991; Peteraf, 1993; Wernerfelt, (1984), define resource based view theory as attaining competitive advantage by mobilizing firm resources and capabilities.

Resource Based view Theory (RBVT) argues that firm performance can be achieved from the implementation of firm distinctive resources including, weaknesses and strengths of the firm that enables the firm to attain its objectives and targets. According to Agyapong et al., (2019), resources of the firms varies in different categories positioning from intangible assets including, green practices, information, goodwill, routines, firm attributes, processes, knowledge and capabilities, output resources and transformation to tangible assets including, equipment and machines. Whilst Sharfman et al., (2009), opined that firms leverage on implementing supply chain practices for the purpose for attaining competitive advantage. The moderating variable will be guided by the resource based view theory. Barnley (2010), stated that resources amalgamates with strategic posture to attain firm performance while, Newbert (2009), opined that information sharing is very crucial factor in determining the complexity and intangibility net worth of the relationship that exist in the firm which is not easy to be imitated by the competitors. Therefore firms in manufacturing sector are motivated to relinquish on green practices to maximize values and cater for production expenses.

According to this theory, green purchasing is simply acquisition of materials, goods and services in aid of right purchasing planning and scheduling factors bearing in mind available environmental factors. Resource based view theory advocates that green purchasing is merely obtaining services, goods and materials by proper and genuine

purchasing scheduling and planning factors in consideration of environmental factors prevalent. When firms attain efficiency and effectiveness in their undertakings therefore, it contributes significantly to securing green. Furthermore, Hart stated that firm's capacity to attain dominance in a competitive surroundings is anchored on firm resource. Green securing is attainable when firms achieve effectiveness and efficiency in their undertakings. Firm performance is achievable through administering of green manufacturing and also mobilisation of clean production schemes and plans (Shan et al, 2020; Mueller (2015). According to a study undertaken by Sharfman et al., (2009), attributed that achieving firm performance therefore, it requires substantial effort of firms to employ and relinquish green practices in their occupation.

The significance of resource based view theory relies on the fundamental flexibility to distinguish how firm performance and green practices are affected by resources prevalent. The theory of resource based view is extensively applied for designing, shaping and moulding the flexibility and strengths in relation to supply chain and networking in manufacturing (Makhija & Balaji, 2020). Achievements in these era relies on timely exchange of efficient information. Makhija et. al., (2001), advocated that firm performance is linked to efficient and effective distribution of propriety and intellectual capital contrary to financial capital and physical assets. Information and knowledge is a composite important resource that a firm relinquish, Grant (1996). Whilst, Spender (1996), advocated that the central tendency of the theory is basically rooted to its exclusiveness of information and knowledge.

Resource based view theory demonstrates how manufacturing firms utilizes the perquisite available resources to supplement and append value to its products. The fundamental significance of the theory is rooted to innovativeness as it fosters firms to be innovative in nature in their service delivery in order to attain substantial firm

performance. There exists two underlying fundamental assumptions relating to firm-resource based and reasons as to why some firms continuously and persistently outshines their competitors in their undertakings. Barnley & Peteraf (2003), stated that firms can own and command package of different resources, although working within the same jurisdiction and industry. The heterogeneity assumption of this theory states that majority of firms tends to inhibit the characteristics which distinguishes them from their proponent's for instance, skilled knowledge which can be attributed by the uniqueness of resources endowment and lastly, the diverge and prolonged differences in resources which can be attributed due to its nature of adversity of mobilisation of resources within the firm.

2.4.2 Ecological Modernization Theory

The theory of ecological modernization came into existence among the class of intellectual philosophers in the early 1980's at the social science research centre in Berlin Germany and Free university. Among the proponents are Janicke Martin and Huber Joseph. Several writers engaged analogous and comparable ideologies in their due course for instance, Huisinigh Donald, Roenfeld H. Arthur, Lovins Amory and Kemp Rene. It was later enhanced by (Sonnenfeld & Arthur, 2001).

According to, Gouldson and Murphy (2000); Janickle (2008). The theory of ecological modernization states that collective achievement and environmental management can be attained by way of state planning, preventive innovation, technological development and subsequently coordination, not foregoing product innovation, management and technology process (Spaargaren & Mol, 1993). Collective collaboration between state and market partners must deploy responsibilities which are new in nature for the ultimate purpose of safeguarding the environment, the state should therefore employ regulation and means whereas the market should work with customers and companies.

Weale (1992), stated that, the essence of state in this particular scenario is actually its flexibility and prevention as its requirements is actually to design networking with other social affiliations prevalent and decentralizing diversity of avenues and tools surpassing coercion.

Ecological modernization theory is a macro level theory that needs to be integrated with level theories to expound green supply chain management concept. Scholars for instance, Basu et al., (2015), advocated that centric innovation approach technique should be a perquisite entrenchments of green management practices including, green manufacturing, green packaging and green purchasing. In similar line, Zhu et al., (2012) stated that innovations are dynamic in nature and it's therefore escalates along certain passage over due course including suppliers probing partnerships to distribute resources that are needed. However, Magazzino et al., (2021), stated that technological innovation is adversely analogous with firm performance enhancement, therefore pursuing innovations should be a cornerstone to firms who are in longer heads in graving greater heights in superior firm performance. The greening effect appears to be enhanced as a result of firm growth, this can be well attributed within a section of areas for instance, the small firm's owner managers accepting their firms to be lean to a degree that green aspect, entrenched on efficiency achievements is insignificant. According to, Rajan & Petersen (1994); Michaelas et al., (1999), anticipated that capitalizing on green aspect by large and smaller firms will tend to be unsuccessful if significant information outlay is not available.

Environmental preadaptation of economic growth and industrial development is the assumption of the theory of ecological modernization, since ecology and economy can be enthusiastically incorporated grounded on perplex informed self-interest. Green economy including prolific adoption of environmental media and natural resources

(ecosystems, air, soil and water), this can result to analogous growth and future development contrary to labour productivity and subsequent capital productivity. Progressive growth in these places significantly minimizes amount of emissions and resources turnover changing the structure and quality of the industrial metabolism. The theory of ecological modernization guarantees human beings a functioning responsibility to dwell on in for the purpose of enhancing the environment capacity which entails adopting and enabling green management practices in place.

2.4.3 Sustainability theory

The theory of sustainability emerged from an author Elkington John who was then a serial entrepreneur and advisor. He is the mastermind on the philosophy of sustainability and corporate responsibility. He was an honorary chief pollinator and chairman of sustainability theory. According to Hart (1997), the theory of sustainability entails not relenting the strengths and power of forthcoming reigns to get satisfaction while at the same notion meeting the necessities. It pursues development which are market driven for the sole purpose of heightening state of economy while at the same time protecting the environment. Sustainability commissions to identify the linkages between economy, environment and society.

According to Alzawawi (2014), attaining firm performance, the theory of sustainability is significant since it robustly monitor green practices including, green manufacturing, green packaging and green purchasing towards environmentally friendly business and subsequently sustainability in order to minimize costs and foster environmental sustainability in manufacturing firms. Green purchasing denotes intrinsically altogether inexplicit contradictory strategy arbitrating impediments to growth. Firms engages with international firms to deliver adequate while at the same point creating a robustly supply chain, it entails firms effort to acknowledge the perquisite cost element of business for

sustaining the business in the upcoming reigns. Empirical studies for instance Seman et al., (2019), examined the influences of supply chain management practices on information sharing while further justification was made by Foo (2018), where he stated that transparency in the process of engaging supply chain management practices by firms should be a priority aspect. Therefore the most essential priority aspect for firms in any industrial and manufacturing sector is to engage on the sustainability by ensuring information sharing and green practices are inclusivity incorporated. Firm managers are required to explore the requisite elements needed for information creation while considering green practices for the purpose of attaining firm performance.

Sustainability theory devotes to amalgamate and classify social acknowledgement to cultural and environmental affairs. Sustainability philosophy has enabled variety of conversation to an ideology will human motion with contentment clasp itself intrinsically of its dreams contrary to the dependency between the diverge global and local magnitude. Therefore, sustainability theory explicit interests that are practically to the distinguished reciprocity of both ecological structures and human directives not foregoing the issues of social justice, economic fitness, integrity, and long lasting capacity that is detrimental in merchandizing long term, prescient and socially ethical imaginative aspect of universal anxiety. Criticism has entered the symbolic talk since the theory of sustainability commit to avow ecological dependency and forthright facts. It evokes firm's deliberation in terms of constituent firm's habits, basic beliefs and subsequently world perception overarching. Hence, most emphasize should be upheld in order to formulate universal production process to ensure just, even handed and universal sustainability factoring in the ideology of firms interests and substantial rights.

2.5 Empirical Review

2.5.1 Green Manufacturing and Firm Performance

According to Seith et al., (2018); Rashid-Abdul et al., (2017). Green manufacturing is defined as the procedures and techniques in place that permit the firm regardless of its structures to acknowledge the tendency of the essentiality of the negative impacts which renders efficiency reduction, reduces productivity and more so increases the cost elements. While, Vrchota et al., (2020), anticipated that the aspect of green manufacturing entails the accountability in matters appertaining to green production. The concept of green manufacturing is an emerging model of manufacturing that factors in sustainable environment (Deif, 2011). Maximization of resource to ensure efficiency while curtailing the negative effects of the surroundings while at the same note realizing the full potentiality of both social and economic privileges and gains is centred to the philosophy of green manufacturing. The concept of green manufacturing asserts on reducing environmental impacts by enabling reduced recycling, reuse not foregoing remanufacturing since it marshal resource consumption optimization, source reduction and fostering use intensity (Shang et al., 2010; Mbohwa & Fore, 2014). According to Wei & Orji (2016), green manufacturing entails waste reduction, environmental protection, compliance regulatory and pollution management.

Green manufacturing encompasses four substantive dimensions, this dimensions includes; sustainable supply chain management, sustainable product design, sustainable end of life management and lastly but not least sustainable process, Eltayeb (2019). According to Lindhqvist and Johansson (2005), green design is fostered by means of design for the environment, thus enabling producers to design materials and products that ensures specifications of the ecology objectives are adhered to. A closed loop is the dimensionality that the designers at the design stage review in the manufacturing which

initializes from the point of management product recovery (Deif, 2011). The significant elements of green product development includes, waste minimization, elimination of hazardous components and materials designing products and components with reuse and recycling elements and designing materials, products and components for remanufacturing with design volume and shapes for space utilization while transporting and storing (Udin & Khor 2013).

Several studies on green manufacturing has been made for instance, Shivastava & Shivastava (2016), stated that embracing the green concept in the production perspective incorporated with coherent, systematic and structured energy use, the manufactures of cement in India lower the expenditure as well as minimizing the impacts of production to the surroundings while factoring in reliability elements, quality dimensions and performance factors. Mbohwa and Fore (2014), opined that archaic methods were applicable for most industries for instance manufacturers of cement in South Africa adopted the methods since it was a requisite for the stated industries to advance in control process innovations and subsequently process optimization for the sole requirements of waste minimization while reducing the ecological influence on production lime. Manufacturing firms which embraced methods and processes that are green including bucket transportation enabled minimal leakage and thus rendering curtailment in raw material waste and more so environment emissions. Housekeeping practices including optimal inventories are the essential features of curtailing the costs associated with production.

A study by Digalwar et al., (2017), suggested that enabling green manufacturing practices contrary enhances production costs and enhance quality trilogy on the same note, Zhang & Li (2018), anticipated that green manufacturing effects positively to the surrounding environment since it reduces gases emissions and waste prevalent in

production process. According to a study conducted by Eshikumo (2017), green manufacturing practices including efficient use of energy processes and reduced waste that poses an impact of curtailing production cost element in the cement manufacturing which at loggerheads improves firm performance. Firms that embrace green manufacturing practices on this perspective were able to curtail the cost element while at the same point controlling the adverse environmental pollution. A study conducted by, Wei & Orji (2016), stated that the comprehensive cost in production of green manufacturing in firms is largely less as compared to the cost element in conventional firms.

Studies on green manufacturing performance on simply a sole manufacturing firms were conducted by researchers including, Wei and Orji 2017; Mbohwa and Fore, 2017; Shrivastava and Srivastava, 2016; Eshikumo (2017), notable elements that are essential are the requisite diversification of research studies to broaden and bring on board the diverge firms since the results may not be hypothesized to all firms. Mbohwa and Fore (2014), advocated that majority of manufacturing firms in developing countries including Kenya are unable to settle the cost element associated with acquisition of machines and manufacturing equipment and thus unable to modernize and refurbish archaic methods applied in production line, thus it raises an alarm in the shift to adopting and implementing the green manufacturing concept in place to ensure efficiency and effectiveness in the production in the manufacturing firms.

2.5.2 Green Packaging and Firm Performance

Green purchasing entails the application of recyclable material packaging, the use of non-hazardous material packaging, reusable packaging and the use of biodegradable material packaging at the same time enabling reduced packaging size for the purpose of lowering the cost associated with transportation, minimizing carbon footprint and in

the same level enhancing improved fulfilment of rack space. Ouyang (2014), stated that the concept of green packaging is denoted with substantive significant elements for instance, green packaging minimizes the cost associated with solid waste and packaging cost while at the same time improves environmental associations by way of substitute packaging techniques and materials. In similar line, Cosimato and Troisi (2015), articulated that the reduction in cost element associated with liabilities and waste while at the same notion structuring firm corporate picture is the detrimental aspect of green packaging.

Green packaging has been the topic of discussion since and therefore, there exists negative and subsequently positive perspectives regarding the effects of packaging to the environment. The negative effects includes the unattended effects of the environment linked to packaging that exists uncertain, while positive perspectives is attested by economies that have significantly minimized the level of waste packaging directed to landfill, for instance; 61% packaging waste in Europe Besch et al; 2016; Sasten (2012), was attended in 2008 by recycling, this however denoted a significant increase in 55% objective point as demanded by the Europe packaging and waste directive (PPWD) year (2008).

The evolution of green packaging purposes are repeatedly in regard of manufacturing firms, therefore, it tends to evolve from simple methods of processing including elements for instance; tamper evidence, features that are convenient and also active innovations packaging that lengthen shelf life of the product while in due respect safeguarding quality of the product while at the same point enabling technological intelligence that will aid status to the shareholders food or the surrounding (Palsson & Besch, 2016). The main purpose of packaging is mainly to distribute and safeguard the required products to the required consumer in a cost efficient, security and friendly user

way (Gronman et al., (2013). According to Lewis (2007), stated that environmental effects of supply chain management can be alleviated by enhanced packaging, the theory stipulates. Integration of process development packaging should amalgamates the essentials of packaging for the entire supply chain management.

Debbie and Lyndsey (2014), stated that in this current generations the end users tends to be aware on the issues relating to their social responsibilities all-inclusive of their forthright effects on the surrounding with their behaviour related to purchasing, while majority of them are aware of the privileges of adopting purchasing decisions which are environmentally friendly. While, Juwaheer et al., (2012), stated that consumers purchases can be significantly impacted by marketing strategies for instance, green packaging. According to, Henrik & Katrin (2016), total consumption resource, waste and subsequently emissions within the entire supply chain can be reduced by means of enhanced packaging aspect.

According to a study conducted by Abdenmour & John (2016), opined that the structuring of food packaging has been enhanced to incorporate and to sustain quality of food, and also to notify the end users concerning the perquisite elements of the product enclosed. Selection of the proper material and size of packaging could ultimately reduce costs associated with logistics Power packaging, (2010). While empirical studies for instance a research done by Sing et al., (2016), stated that reusable packaging systems has been widely adopted by majority of firms, since adoption of reusable containment positively minimizes product damage and curtailment of solid waste in shipping which will subsequently elevates safety problems and at the same time eradicating ergonomic.

The concept of packaging entails the application of green packaging components and downsized packaging, (Ninlawan et al., 2010). There is need for collaboration between the dealers to enable packaging which is standardized while at forthright employing methods of packaging which are essentially returnable and also enhancing packaging components which poses reusability and recyclability features. Murphy (2012), stipulated that manufacturing firms nowadays tends to inhibit a lot of constraints to initialize and contain mechanisms of eco- friendly during disposal stage. According to, Hasan (2013). Programs has been implemented by majority of the economies essentially to minimize the packaging amount that flows to the misuse direction while at the same level safeguarding the impact of packaging to the environment. Environmental policies and regulations schemes have been employed by the states, enabling various firms to adopt the environmental undertakings for sustainable distribution practices (Murphy, 2012).

Bordignon & Arboretti (2016), opined that packaging is integrated with both marketing and logistics aspect, since it safeguards the materials and products while enabling information to the end users. According to Suwannaporn & Jinkarn, (2015), the aspect of packaging entails makers of policy and end users, for instance packaging roles includes preservation, containment, communication, protection and lastly functions of marketing and convenience. The fundamental element in manufacturing firms is packaging. Packaging element is the identical visibility that triggers as the linkage that exists among the atmosphere exterior and contents. Sign et al., (2012), opined that there exists several functions related to packaging which entails, intelligent packaging, transport packaging and information packaging.

Firms in these current dynamic environment should employ non- hazardous packaging avenues, since these avenues satisfies and extends the desirable regulations and

expectations in consideration of risks associated with carbon emissions. Wastes associated with packaging plays a detrimental role in fostering concerns related to environment, emanating to improving regulations related to generated amounts. Applications of biodegradable components amounts to environmental reduction effects connected to packaging materials disposal as well as enabling sustainability, Song et al., (2009). The classifications of packaging relating to hazardous products should be perfectly and appropriately categorized, packaged, described, marked, labelled while factoring in the conditions for logistical operations considering the regulations pertinent.

2.5.3 Green Purchasing and Firm Performance

Muhammad & Xu, and Zhou (2019), define green purchasing as incorporating environmental barriers and aspects with purchasing procedures. According to Sezen & Cankaya (2019), incorporation of environmental achievements relies on the firms attainments and accomplishments, while factoring in purchasing activities in place. It is necessary to select the appropriate supplier in attaining firm environmental goals, however firm performance improvements is not only limited to the selection of the appropriate supplier. Green purchasing referred to as green buying resource that pursue products recruitment adhere to firms environmental requirements including, resource saving, restructuring, stimulus, waste reduction and subsequently substance adequate replacement. Large firms do engages in activities which are green based rather than smaller firms, however these practices are the propelling derivatives in relation to environmental consciousness and advances in firm (Qianli & Khan, 2017). According to Maan and Faris (2020), stated that competitive edge in firms is attained through green purchasing and in similar line, Okoumba and Mafini (2018), opined that green purchasing positively impacts the firm performances indirect or directly.

The function of green purchasing is the engagement of sourcing reduction activities in the supply chain (Carter & Cater, 1998). On the same level, Galle and Min (2001), opined that green purchasing reinforces recycling activities while at the same time safeguarding the system while minimizing the waste source in the channel. The concept of green purchasing plays a significant role in ensuring concerns of the environment are adhered to in relation to purchasing guidelines, and purchasing programs. According to Foo et al., (2019), eco-friendly aspects including; recyclability, reusability, components which are harmless are the elements that green purchasing takes into the account. While Unal and Shao (2019), stated that firms should provide essential designed guidelines to its suppliers including considerations of the environment for purchased green items which calls for firms to incorporate the green philosophy in purchasing. According to a study done by Carter et al., (2000), on green purchasing, he analysed the impact of green purchasing on firm environmental performance and firm financial, the findings indicated that successful application of green purchasing elements in the supply chain curtailed the costs associated with pollution control and also environmental performance was enhanced while at forthright enhancing the firm image.

Large firms adopt green purchasing contrary to small firms Kneindorfer et al., (2015). Implementation of the concept of green purchasing is the most widely acknowledged aspect of green supply chain management practices. A procuring firm with green aspects will concentrate on the suppliers green practices specifically the medium- sized and small firms. Buying firms may employ collaboration based aspects for instance; information sharing that is environmentally friendly, training and jointly research enhancement for the ultimate purpose of meeting goals that are environmentally friendly in nature.

Enhancing firm performance is derived from green purchasing which constitutes the establishment of competitive advantage while at the same time safeguarding the resource (Geng et al., 2017). Several empirical studies has been undertaken on the concept of green purchasing on the relationship between firm performance and subsequently environment-friendly purchasing for instance, a study undertaken by Zailani et al., (2015) on the relationship between environmental- friendly purchasing and firm performance opined that eco-friendly purchasing poses a positive and direct effect on firm performance. However, protection of the environment from toxic materials and harmful and hazardous. Purchasing has been categorized into five dimensions for instance; design operation management, supply chain management, ecological, external management environment and lastly environmental authentication. A study conducted by Yang et al., (2014), stated that green purchasing also have a positive and direct effect on firm performance materials. According to Chen (2005), green purchasing integration is an efficient and effective mechanism for regulating pollution while at the same time as a keystone in firm performance and environmental performance while at the similar level building firm reputation in a competitive world (Carter et al., 2020).

2.5.4 Moderating Role of Information Sharing

According to Li et al., (2005), information sharing (IS) is defined as dissemination of information which is crucial and sophisticated in the supply chain. Xie & Zhao and Leung, (2002), opined that there exists three classification of information in the supply chain, and it includes; demand, inventory and order. Information in the supply chain becomes efficient where there exists information sharing between parties for instance; demand information sharing, supplier and retailers. Leung and Zhao (2002), stated that variety of firms in the decennium were hesitant in the process of sharing information

while a study by Lotfi et al., (2013), stated that there exists a barrier in information sharing among a number of firms despite the firms efforts in leveraging seriously in technologies that sustain information manipulation and information gathering.

A study by Fawcett et al., (2007), opined that the bridges to world class information sharing is not linked to structuring, culture nor building for the distribution of effective and efficient information, while Xie & Leung 2002; Mishra & Singh (2011) reiterated that there exists the impediments and hurdles on the part of the firms on the process of enhancing information sharing for instance; incentives problems, cost elements, reliability issues, privacy of information, sophistication of technology, effective information deployment and lastly timeliness and accuracy of information. This information impediments and hurdles conform to the major quality information dimension. According to Yu et al., (2001), ambiguity prevails in the process whereby incomplete information is not achieved, also he stated that the firm might poses information which is complete but it also encounters scarcity of information pertaining to its supply chain members, however, to minimize this ambiguity therefore firms must obtain efficient information from diverge parties in the supply chain. In similar line a study done by Premkumar (2000), denoted that information sharing significantly minimizes ambiguity in demand and also supply enabling firms in the supply chain to be competitive. While, Chen et al., (2000), opined that bullwhip effect is reduced through adoption of appropriate and effective information sharing in the firm. Also Calanone et al., (2002), stated that firm can enhance performance similarly by sharing information while minimizing learning exertion.

Studies on information sharing has been undertaken by various proponents for instance; Vallopra and McGinnis (1999), opined that information sharing which constitutes to time efficient is a competitive advantage and more so a differentiating element in supply

chain management while factoring in aspects of accuracy, timeliness of information and information credibility and adequacy. While according to Balsmeier and Voisin, 1996; Towill (2003), stated that distribution of up to date information by the supply chain management parties constitutes to a competitive benefits in the overall chain of supply, the researcher further reiterated that engaging in information frequently within supply chain by the supply chain parties constitutes to a team work and subsequently enhanced and improved performance. Contrary, Maharaj and Ajay (2010), opined that the financial implication of the whole supply chain is impacted by the information sharing while similarly information sharing that is amalgamated with the diverge knowledge on the perspective of firm performance therefore, the perquisite resultant of the information sharing in place is a determinant factor of knowledge in the take even situation.

Further empirical studies on information sharing has been done by researchers for instance; Dubey et al., (2018), stated that enhancing the visibility, alignment, agility and magnitude levels in supply chain in firms has proved positive while information sharing is the determinant factor in place, so information regulation within the logistical perspective is a perquisite aspect inconsideration of the prevailing environment. While a study conducted by Khan et al., (2016), opined that green practices commitments by firms depends on information essential elements which constitutes to enhancing and improving both economic and environment prevalent. Deployment and employment of sophisticated information and communication technologies by variety of firms can however constitutes to advance in communication within the overall supply chain (Singh & Rezaei, 2019). Similarly, Bag et al., (2020), stated that there exists technologies that fosters and enhance communication for instance; RFID tags, HMI, ERP, PLC, SCADA, information global systems, warehouse management systems,

moving shelf robots and automated guided vehicles. This communication technologies tends to improve and enhance the supply chain context while fostering in the aspect of information efficiencies and effectiveness in place. Moberg et al., (2002) stated that the quality element of information within the supply chain is crucial and significantly necessary. While on the same note, Lin & Lin (2006), opined that quality aspect of information has an influence that can directly impacts firm performance. Therefore improving the quality of information that is shared enhances the capacity and value of information shared amongst the firms.

2.6 Conceptual Framework

According to Creswell (2013) argued that a conceptual framework is a diagram that elucidates the main concepts being studied and the relationship among the variables. Independent variables included green manufacturing, green packaging and green purchasing while the dependent variable was firm performance. In order to ascertain the limits and the conditions of the green supply chain practices and firm performance, therefore a moderating variable information sharing will be used. The figure 2.1 below further illustrates the relationship.

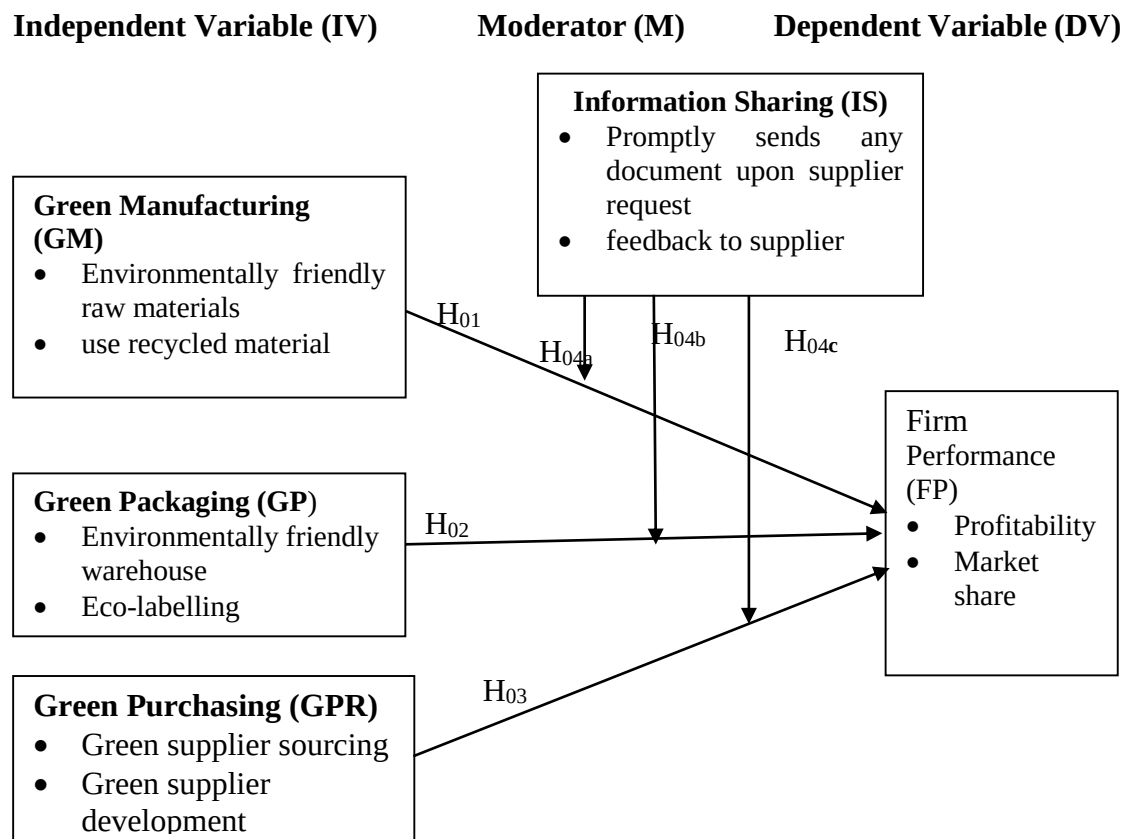


Figure 2.1: Conceptual Framework

Source: (Researcher 2021)

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

This chapter presents research design, target population, sample size, measurement of variables, data collection instruments, validity, reliability and lastly data analysis.

3.1 Research Design

According to Plano & Creswell (2007), research design involves the process of collecting, analysing, interpreting data, and reporting data in research studies. Explanatory research design will be exploited in this area of study. Explanatory research was chosen because it explains the cause effect relationship between the independent variable (green manufacturing, green packaging and green purchasing), whereas information sharing is a moderator and dependent variable (Firm performance).

3.2 Target Population

Manufacturing firms registered with Kenya Association of Manufactures in Nairobi County; Kenya (KAM, 2021) were the target population of interest for this study. There are 650 manufacturing firms in Nairobi County, Kenya classified according to sectors as depicted in the table 3.1 below. These manufacturing firms offer different products depending on their nature of production activities. Appendix IV depicts the distribution of manufacturing firms, since KAM 2021 directory has already clustered these sectors. The unit of analysis were registered manufacturing firms in Nairobi County, Kenya.

The unit of inquiry were purchasing or logistics managers from the department of procurement. They are the middle senior level managers who have the confidence in their practical understanding of supply chain operations. Additionally, purchasing

managers are knowledgeable key informants regarding supply chain practices since they are individuals, who in most cases are responsible for supply chain activities and can compare their own units to direct competitors Coleman et al., (2011), they also have sufficient knowledge about procurement. Stratified and random sampling technique was employed in this study. Thus, data was collected by administering questionnaires.

3.3 Sample Size

According to Wegner (2006), sample size is defined as the statistical precision of the findings in place. Sample size denotes the change in population specifications which is in the process of inquiry and the quality dimension required in the inquiry. Naing et al., (2006), anticipated that the literature would maximize on the adequacy and appropriateness of the sample size so as to derive the needed impact precision and size of the findings which can be inferred back to the population. The formula that would be replicated to ascertain the sample size with minor correction in the population was adopted from (Naing et al., 2006). Where;

$$S = \frac{NZ^2PQ}{d^2(N-1) + Z^2PQ}$$

S- Denotes the sample size,

Z- Denotes Z statistic for confidence level 95%,

P- Denotes population proportion estimated to bear the desired traits,

D- Denotes precision levels/ degree of accuracy (1-p).

There were 650 targeted manufacturing firms in Nairobi County, Kenya. Daniel and Naing et al., 2006; Macfarlane (1999), stated that in order to attain a large sample size therefore, the population anticipated should be 50%. Similarly 95% confidence level

and respective precision of 45% to 55%, or 5% statistical error would also be used in accordance with prior empirical research (Naing et al., 2006; Macfarlane, 1997).

$$S = \frac{650 \times 1.96^2 \times 0.5 \times 0.5}{0.05^2(650 - 1) + 1.96^2 \times 0.5 \times 0.5}$$

$$S = \frac{624.26}{(1.6225 + 0.9604)}$$

$$S = 242$$

Table 3.1 Sample Frame

Sectors	Target Population	Sample Size	Number of Managers(x1 procurement or logistics Department)
Agriculture/Agro-processing	40	15	15
Automotive	28	10	10
Building, mining & construction	42	16	16
Chemical & allied	40	15	15
Energy, electrical & electronics	52	19	19
Food And Beverages	108	40	40
Leather and foot ware	6	2	2
Metal and Allied	40	15	15
Paper	20	8	8
Pharmaceutical & medical equipment	24	9	9
Rubber & plastics	30	11	11
Textile & apparel	34	13	13
Timber	16	6	6
Services and Consultants	170	63	63
TOTAL	650	242	242

Source: KAM (2021)

A sample size of 242 manufacturing firms registered with KAM 2021 was ascertained from a population size of 650 manufacturing firms in Nairobi County, Kenya by adopting a formula (Naing et al., 2006). Consequently, one manager from procurement or logistics department was picked to fill in questionnaires in order to aid as a unit of analysis. This was justified adequate sample size (Morgan & Voorhis, 2007).

3.4 Measurements of Variables

3.4.1 Firm Performance

According to Bedi (2019), firm performance entails the substantive results or output as determined against its intended yield. Firm performance in this case is the dependent variable. According to a study done by Yim et al., (2004), measurement aspects of firm performance entails; market share, customer satisfaction, while Abdu et al., (2010), further enumerated measurement of firm performance for instance; new product development and customer satisfaction. Therefore, the instrument for measurement were constructed to aid in hypothesis testing. Lin and Luarn (2005), advocated that employing items for construct from the previous studies would foster validity of the instrument. Hence, firm performance in this study was measured by the use of five item point scale that measured the performance by providing questionnaires to respondents to evaluate the firm performance on the perspective whether, total sales have grown faster than that of their main competitors, whether there is a higher level of customer loyalty with our customers, whether the firm has achieved new product development than our main competitors, market share has increased faster than that of their main competitors, whether the firm has achieved better customer satisfaction on product quality compared with those of our competitors

3.4.2 Green Supply Chain Management Practices

According to Jasneet et al., (2018), green supply chain practices includes, green manufacturing, green packaging and green purchasing. In this case independent variables are the three variables in the study. The dependent variable (firm performance), is impacted by independent variables, (green manufacturing, green packaging and green purchasing) in various situations or to anticipate the resultant of the aspect in review.

Five-point Linkert scale was used as a measurement level for the variables (Boorne, 2012). Respondents were provided with a questionnaire on firm performance based on a rating of five-point, in this case 1 entailed “Strongly Disagree” whereas 5 constituted “Strongly Agree”. In this level green manufacturing was measured through providing questionnaires to respondents based on whether the firm collaborate with supplies in designing products which are environmental friendly, the firm use recycled material in their manufacturing process, the firm has effective mechanisms that control emission of harmful gases to the environment during process of productions, the firm recycles internal waste generated during manufacturing process, reduction in pollution by contracting firms that observe environmentally friendly principles or EMS certified, the firm contract firms who adhere to environmental rules and are EMS certified during manufacturing process, the firm practices Safe disposal of non-recyclable waste (especially hazardous waste). And on the green packaging perspective measurement was based on whether the firm use environmental friendly material for packaging, the firm collaborate with its distributors/vendors in adhering to environmental friendly rules when packaging, the use environmental friendly warehouse for storing it packaged products, the firm labels their packaged product with a notice on customer and how to handle, use and dispose the products, the company has adopted Eco-labelling to describe the information of a product about the environmental impact, the firm use recycle material for packaging to reduce disposal of packaging material by using materials with recyclable contents and contrary on the aspect of green purchasing measurement were based on whether the firm purchase products/raw materials from supplier who adhere to environmental standards and are EMS certified, the firm select supplier who have the capacity to develop materials which are environmentally friendly, the firm purchases material that can be recycled, the firm purchases products

that are packaged with bio degradable materials, the firm use materials which are less toxic and hazardous through it purchasing process such as electronic received, order and payment.

3.4.3 Information Sharing

According to Li et al., (2005), Information sharing encompasses the transfers of proprietary information and crucial information within supply chain partners. In this study information sharing is a moderator. A moderator is defined as a variable that revise and broaden the structure, power and robustness of the relationship that exists between dependent variables and independent variables. The power and robustness of a relationship that exists between the dependent variables and independent variables is determinant of the moderating variable strength and value. Aiken and Aguinis (2004), stated that moderation consideration ultimately influences crucial and significant empirical studies in adverse investigations.

Five-point Linkert scale was used as a measurement level for the variable (Boorne, 2012). Respondents were asked to give a rating of information sharing on a five- point rating level, consequently 1 entail “Strongly Disagree” whereas 5 entails “Strongly Agree”. Respondents were required to evaluate the manufacturing performance of the firms by taking forth sequence of accounts manifestations drafted categorically for instance; whether the firm regularly shares accurate and integrated information with our suppliers, the firm promptly sends any document upon supplier request, our supplier easily share information with us upon request, the firms’ gives immediate feedback to supplier on products delivered, the firm ensure their regular and effective communication with its suppliers, the firm conducts periodic meetings with suppliers to address their views and or problems, the firm ensures that both parties are regularly informed about events or changes that may affect the other party.

Table 3.2: Measurement Scale

Variable	Measurement Scale	Author
Independent Variables		
Green manufacturing, green packaging and green purchasing	Five point Linkert scale	Boorne, 2012, Yim et al., 2004
Dependent Variable		
Firm performance	Five point Linkert scale	Abdu et al., (2010) Brito (2012), Alex & Hill (2007)
Moderating Variable		
Information sharing	Five point Linkert scale	Boorne, 2012

3.5 Data Type

Primary data is applicable in this area of study since this research was conducted at the area of the study, basically by use of observations.

3.6 Data Collection Instruments

This study adopted primary data collection hence, questionnaires (structured) were used. In the questionnaire closed questions were asked.

3.7 Validity and Reliability

3.7.1 Validity

According to Orodho (2019), validity refers to extent to which the results derived from investigation and review of the data persist noticeable certainty in the analysis. The main characteristics of validity is its significance and precision presumption. The distinction of validity can be well attributed in terms of its weakness, for instance; weak validity curtail amplitude to distinguish correlation variables of the data under research. Ferreira and Pitino (2018), stated that measurements of research instruments were based on certain dimensions which includes; external and internal validity and whether this parameters seriously measures what is required. They further reiterated that validity is

examine by adopting at least four perspectives of validating the research instrument namely; content validity, face validity, construct validity and criterion validity.

To determine content validity therefore the variables under investigation and review were constructed based on the prior studies on the concept of green supply chain management and firm performance. Diverse opinions from university supervisors with professionals of the School of Business and Economics, Moi University were pursued. Also, a wider approaches from the extant study literature review were cross examined. While measurements of face validity were based on scrutiny of the studied concepts to exhibit what ought to be measured. Construct validity were measured through a critical investigation of the theories underpinning the paramount variables under review. Zikmund (2013), opined that construct validity should demonstrate higher relation that exists between the constructs and the measurements of the concepts should be based on theories underpinning the study. Furthermore, construct validity can be employed by examining supply chain management practices and firm performance by interrogating extant literature. Lastly, criterion validity examination and measurements were based on the findings that has been generalized from the target population of the manufacturing firms in Nairobi County, Kenya registered with KAM 2021, where the sampling size were inferred. Construct validity was tested using factor analysis

3.7.2 Reliability

Twycross and Heale (2015), define the terminology reliability as a measurement instrument in research studies which measures the levels to which the research instrument relinquish persistent outcomes when repeated trials are made. In other words, it signifies the levels of measurements that replicates a random error which ought to be free. The larger the random error the unreliability tends to be larger. Subsequently the reliability in the research was examined in aspects including;

achievements and benefits of the measuring instrument, in this case if research instrument tends to inhibit a poor degree of reliability therefore its resultant effects does not signify validity (Samuelson, 2010), lastly there might exist a trust of examining whether the research instrument measures consistently and relatively the research variables in relation to the change in results due to changes in variables on whether its imminently the perception of the unreliability of the instrument in question.

Pilot study was conducted in manufacturing firms based in Uasin Gishu County registered with KAM 2021. Firms chosen from Uasin Gishu had similar characteristics with manufacturing firms in Nairobi County. The term pilot study is applicable in diverge situations in research science. Polit et al., (2001), define the pilot study referring it to visibility study which prompts to its small version trait, and trials before the actual study is done. According to Baker (1994), further stated that trying and pre-testing of the available research instrument is doing pilot study. Whereas Devaus (1993), opined that the most benefit and significant feature of performing the study pilot is actually the alarming nature of its functionality towards the major project research and where dwells on, where it fails to commit the research elements and the instruments or methods are extensively difficult to authenticate since they might be too complex. Empirical studies for instance Connelly (2008), opined that a pilot study sample should constitute 10% of the sampling anticipated for the imminent bigger parent study. Moreover, Hertzorg (2008), critique the same notion stating it's however not clear nor transparent affair to deal with this aspects since this kind of research are impacted by a lot of features. While Michael and Isaac (1995), propose 10-30 parties and Hill (1998) propose 10-30 parties in research survey for a pilot study while, Treece and Treece (1992) propose 10% of the sampling size project similarly Belle, 2002; Julious (2005) propose 12. In order to attained reliability of the instrument research therefore, the

information obtained in the pilot study was detrimental. However, the respondents from pilot- tested firms, were not part of the study, as this would introduce biasness.

A proper technique for determination of consistency internal magnitudes of the elements is actually the correspondent Cronbach's alpha coefficient technique. Swerdlick and Cohen (2005), stated that the technique is quite convenient due to its nature of application since it demands at least one administration at a time. Cozby (2003), opined that it's convenient where components poses options. Prior studies anticipated that between 0.80-0.95 therefore, it's regarded having best reliability feature since it indicates error which is minimal thus the outcomes would be rendered, Zikmund et al., (2013). According to Hair et al., (2010), research coefficient of 0.62 is adequate. The study would render the elements as reliable if at all they would yield coefficient reliability of between 0.70 and beyond. Wallen and Fraenkel (2013), anticipated that the figure would be deemed desirable for levels of consistency.

3.8 Data Analysis

Data analysis refers to a sequence of generating order, formation and meaning of multitude data assembled, Mugenda (2003). The questionnaire was utilized for gathering quantitative information from the manufacturing firms in Nairobi County, Kenya. Information gathered was analysed in two levels for instance; descriptive and subsequently inferential statistics in aid of SPSS version 24.0 (Matthes & Hayes, 2009). On descriptive statistics it involves the application of standard deviations, median, use of means, kurtosis not foregoing skewedness and minimum and maximum values. Charts and tables were used during presentation of data.

The kurtosis values and skewness were the mechanisms of ascertaining the normality and initial features of the variables under study and review, in this case, a range between

-1.96 to + 1.96 for the skewness and subsequent -3 to +3 for kurtosis (Ghasemi and Zahediasl, 2012). Factor analysis and Cronbach coefficient alpha was the mechanism for ascertaining the validity and reliability scale in the research study. Parsons Product Moment correlation (PMPMC) was used to ascertain correlation analysis by testing the linear relationship and usability of variables in regression analysis. According to Podsakoff et al., (2003), the Harmon's factor test was employed to determine if usual technique variance prevalent in the predictor and subsequently resultant variables augment the prior association between the variables under investigation.

Hierarchical regressions is more replicable for evaluating the contribution of predictor variables that support a theory Lewis (2007). It's preferable to use hierarchical regression analysis when one has an idea about the order in which one wants to enter predictors and one to know effects on criterion. The purpose would be to analysis the hypothesised relationship and strengths of each construct in its respective model (Hair *et al.*, 1995). Gliner et al., (2009), stated that multiple regression has been deem as a better statistical technique especially on the aspects of research approaches which is associational and has various dependent and independent variables.

3.9 Model Specifications

Since the study considers several variables (independent variables and dependent variable); the hypotheses were tested using hierarchical regression as shown below.

The hierarchical model used in this study is given as;

$$FP = \beta_0 + \beta_1 GM + \beta_2 GP + \beta_3 GPR + \varepsilon_1 \dots \dots \dots (i)$$

$$FP = \beta_0 + \beta_1 GM + \beta_2 GP + \beta_3 GPR + \beta_4 IS + \varepsilon_2 \dots \dots \dots (ii)$$

$$FP = \beta_0 + \beta_1 GM + \beta_2 GP + \beta_3 GPR + \beta_4 IS + \beta_5 GM * IS + \varepsilon_3 \dots \dots \dots (iii)$$

$$FP = \beta_0 + \beta_1 GM + \beta_2 GP + \beta_3 GPR + \beta_4 IS + \beta_5 GM * IS + \beta_6 GP * IS + \varepsilon_4 \dots \dots (iv)$$

$$FP = \beta_0 + \beta_1 GM + \beta_2 GP + \beta_3 GPR + \beta_4 IS + \beta_5 GM * IS + \beta_6 GP * IS + \beta_7 GPR * IS + \varepsilon_5 \dots \dots (v)$$

Where FP = Firm performance.

$\beta_1 \dots \beta_2$ = Represents the slope which shows the extent to which firm performance changes as a result of a subsequent deviation of independent variable by one variable unit.

GM=Green Manufacturing.

GP=Green packaging.

GPR= Green purchasing.

β = Represents independent variables coefficient.

β_0 = Represents the Y-intercept/ constant

e = Represents the error term

Moderation effect of information sharing was analysed using the regression model, the second model sought to establish whether Information sharing would have an impact which is directly on the performances as a moderating variable, while the third equation would be used to test the moderation impact of information sharing.

3.10 Assumptions of Regression Model

Before conducting regression analysis and evaluating the hypotheses, it was essential to run diagnostic tests to ensure that the assumptions of regression model are met (Green, 2007).

3.10.1 Normality test

Assumptions of regression models is the normality distribution of residuals for valid hypothesis testing. Shapiro-Wilk test is used to test the assumption for normality. Test hypothesizes the distribution normality indicating that the distribution is normal, indicating that null hypothesis predicts normality of residual distribution. Tharenon et al., (2007), stated that assumption of normality is its continuous variable that scores and are normally distributed at the mean. Normality of independent variable was tested using mathematical methods. Distribution normality was checked by use of Shapiro-Wilk test, since the tests are calculated using moments about the mean, therefore they are quite sensitive to outliers Shapiro Fracia W Shapiro and Francia, 1972; Royston (1983). Normality was checked by examining P-values of test Shapiro-Wilk Shapiro. Hence, the P-value of test Shapiro-Wilk should be more than 0.05 which signifies that the data is normal.

3.10.2 Multicollinearity

According to Williams et al., (2013), multicollinearity refers to the existence of correlations that tend to be high among independent variables, it's a linear relationship between two or more variables for instance; explanatory research variables. More association between variables may lead to serious problems with the reliability of the estimates of the model and wrong regression results in certain situations. Variation and tolerance inflation factor (VIF) values were used to determine multicollinearity. Leech et al., (2011), stated that a tolerance value of below 0.10 or subsequent variance inflation factor more than 1.0 indicates a severe multicollinearity issue or challenge. The purpose of tolerance in research is to specify variability quantity of the independent variable not featured by the other independent variables, while the contrary of statistics tolerance is the variance inflation factor.

3.10.3 Linearity

According to Hair et al., (2010), linearity refers to an extent in which a variation in the independent variables is as a result of variation in dependent variables. Person Product Movement Correlation is a tool for determining the variation in dependent and independent variables. Ultimate objective of linearity is to determine the linear association between variables.

A fundamental assumption of the linear regression model is that the association among the variables under study for instance dependent and independent variables is linear. Linearity was tested by the use of scatter plots. Outliers were also checked in the research. Correlation coefficient is the measurement instrument for a linear association and its indicated by (r) coefficient correlation, (r) refers to a measurements that determines the effort and angle of a linear association among two estimably variables in place. The value of (r) ranges from -1 to 1. Negative values of (r) signifies an angle which is negative for the linear association, while (r) positive values denotes an angle which is positive for a linear association, and (r) values nearly to 0 which can be positive or negative signifies a linear association which is weak, while Garlton (1894), stated that values leaning towards -1 or leaning towards 1 denotes a linear association which is effective in a negative or positive perspective. Linearity test was assessed using ANOVA for linearity for each variable with statistical package for social sciences, (SPSS), following the accepted procedures. The rule of thumb is if there is linearity $p < 0.05$. However, the reverse is true if the value > 0.05 .

3.10.4 Homoscedasticity

According to Knaub, 2007; Rambeli et al., (2019), homoscedasticity is a state where the term error, specifically random distraction in the association among the dependent and independent variables are similar transversely along all values of independent

variables. To test the assumption homogeneity variance in relation to design subjects therefore Leven's test of equality of variance was used in which SPSS was used to determine the statistical homogeneity assumption. For instance; when the p-value of Leven's test is less than .05 therefore, the resultant assumption has been disregarded and it ought's to make judgemental decisions on whether, to remove issues in a list wise style or perform transformation based on log arithmetic method on a continuous variable and also adopting statistics that are non-parametric since they are homogeneity robust. The homogeneity assumption of variance is attained by considering if the p-values of Leven's test is more than .05 and therefore the test of statistical parametric can be inferred. The assumption is significant to independent samples t-tests and ANOVA tests.

Assumptions of equality and similar variances of the groups that tends to be distinct is the homoscedasticity. While testing hypothesis in this situation two tests are implied that residuals from regression are homoscedastic. Hypothesis test outcomes for linearity ratios representation expounds association among variables compared to subsequent linear ratio description is true. F-statistic techniques and the use of parametric is the test. Secondly, the application of the headcounts of peaks in sequence form of residuals unsigned were used to ascertain non parametric test. Alternatively, assumption of homoscedasticity perform significant function compared to validity and normality, since the F-test which is used in ascertaining the whole variation in means of groups (omnibus test) is sensitive to normality and heteroscedasticity.

F-test would yield incorrect outcomes when data is totally normal. However, the test Wallis-Kruskal is applicable when suspicion in homoscedasticity is prevalent however this test is not significant in relation to the F-test because its distinct data which is original in nature is categorized by ranks while a series of numbers which tends to be

natural for instance; 1, 2 & 3 depicts ordinal differences in its original form. Complexity distribution of Wallis-Kruskal test is a deliberate issue and its application in place. The model homoscedasticity denotes the constant error in dependent variable values. To ascertain homoscedasticity therefore, the finest form is to compose scatterplot with residuals contrary to dependent variables.

3.11 Ethical Considerations

Researchers refers to people authentically and truly nervous about quality of other people's life, (Mugenda & Mugenda, 2003). Researchers should poses integrity in terms of objectivity of the research for instance; the research undertakings should not be for personal benefits and should also not renders the negative impacts to the other parties of the people. They should also poses professionalism, privacy of third parties and information source authenticity. Also they should display openness and transparency while associating with the respondents in the course of the study. Obligatory and required authorization by the university and the ministry of National Commission for science, Technology and Innovation (NACOSTI) was obtained. These demonstrated the significance of collection of data at this ladder which it contributes to averting resistance and suspicion from the respondents. Other ethical clearances were sought at different entry-level in the manufacturing firms.

Informed consent was sort from individual's respondents with full information being provided and comprehension being affirmed, (Traianou & Hammersley, 2012). Also, participant's safety in this study was safeguarded. Anonymization of the informants should be upheld in order to ensure their privacy. There was no undue influence that was exerted on the respondent to do research to suit a particular user (Hurdley, 2010). No one was discriminated unfairly or despised in the process of the research.

Respondent's information confidentiality and privacy rights was safeguarded while shunning torment, betrayal and equity treatment while appreciating the autonomy.

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION, AND INTERPRETATION OF FINDINGS

4.0 Introduction

This section presents the data analysis which was entered into SPSS software version 24 for analysis. The chapter presents results about the response rate, data cleaning and screening, demographic profile of respondents, descriptive statistics of the study variables, reliability results for the research instrument, factor analysis of the study variables, correlation analysis, multiple regression test assumptions, analysis and discussion of the tested hypotheses and section and summary of results.

4.1 Response Rate

In this study, of the 242 questionnaires that were distributed to the respondents, 225 (representing 92.98%) were returned, as depicted in Table 4.1. Out of the returned questionnaires, 205 (84.71%) were valid and usable, 20 (0.08%) were incomplete and therefore excluded from further analysis. Excluding incomplete questionnaires helps to overcome the risk of distorting results like the mean values (Lindner & Wingenbach, 2002). This implies that valid response rate was 205 (84.71%) out of 225 (92.98%) returned questionnaires. According to Caslyn and Winter (1999), the lower the response rate, the greater the likelihood of a non-response bias. To minimize the challenge of non-response bias, Lindner and Wingenbach (2002) suggested that a study ought to achieve a minimum response rate of 50%. Relatedly, Sekaran and Bougie (2010) argue that even a response rate of 30% is acceptable for surveys. Given that this study obtained a higher response rate of 84.71%, it can be considered that non-response bias was not a matter of concern in this study.

Table 4.1: Response rate

Responses	No.	Percentage
Administered questionnaires	242	100
Returned questionnaires	225	92.98
Usable Questionnaires	205	84.71
Unusable questionnaires	20	0.08

Source: Survey Data (2023)

4.2 Demographic Information

Understanding the demographic characteristics of firms is essential for evaluating their performance and dynamics, especially concerning green supply chain management practices and overall firm performance. To assess this, Table 4.2 offers valuable insights into the operational duration and employee distribution of manufacturing firms in Nairobi County. The data reveals that a significant portion of these firms has been in operation for over 30 years. Furthermore, most firms have an employee population that ranges between 101 and 500. Such insights are vital, as they can influence a firm's capability to adopt and implement green supply chain management practices, subsequently affecting their overall performance.

Additionally, the age distribution of the firms is as follows: 11 firms (5.4%) have been operating for less than 10 years; 5 firms (2.4%) for 11-30 years; 69 firms (33.7%) for 31-50 years; 65 firms (31.7%) for 51-70 years; and 55 firms (26.8%) for over 70 years. This data indicates that a substantial portion of the sampled firms has been in operation for over 30 years, potentially reflecting a stable and well-established business environment.

Table 4.2: Demographic Information

		Frequency	Percent
Total population of employees in the firm	Below 100	10	4.9
	101 - 300	88	42.9
	301-500	70	34.1
	above 500	37	18
	Total	205	100
long has the firm been in operation	Below 10 years	11	5.4
	Between 11-30 years	5	2.4
	Between 31-50 years	69	33.7
	between 51-70 years	65	31.7
	Above 70 years	55	26.8
	Total	205	100

Source: (Survey Data, 2023)

4.3 Factor Analysis

The study employed the Principal Component Method to investigate components that were highly connected with green supply chain management practices, information exchange, and firm performance in order to increase the trustworthiness of the data. During the analysis, weak or negative correlation components were eliminated. The validity of the tool was further evaluated using the Bartlett's Test of Sphericity and the Kaiser-Meyer-Olkin Test of Sampling Adequacy. To extract components from each construct, all variables underwent a component factor analysis using varimax rotation. Following the advice of Hair et al., items with a loading factor of less than 0.50 were removed, while those with a loading factor of more than 0.50 were kept. This section presents and discusses the data once the items were accurately assigned to their respective dimensions.

4.3.1 Factor Analysis for Firm performance

The five constructs connected to firm performance are shown in Table 4.3's principal component matrix, which shows how the factors were loaded using the varimax rotation method. The study also included the Bartlett's Test of Sphericity and the Kaiser-Meyer-Olkin Measure of Sampling Adequacy for firm performance in Table 4.3. The results showed that a significant Chi-Square (2) of 623.32 with a p-value =.000.05. The Bartlett's Test of Sphericity yielded these results. Additionally, the data met the criteria for factor analysis on the variable of union organizing activity because the Kaiser-Meyer-Olkin measure of sampling adequacy was 0.799, which was greater than the permissible value of 0.5. Additionally, Table 4.3's factor analysis results showed that only one component, accounting for 67.096% of the variance in firm performance. All items had loadings greater than 0.7 and were thus retained for further analyses

Table 4.3: Factor Analysis of Firm Performance

	loadings
Total sales have grown faster than that of our main competitors	0.897
There is a higher level of customer loyalty with our customers	0.901
We have achieved new product development than our main competitors	0.878
Market share has increased faster than that of our main competitors	0.825
We have achieved better customer satisfaction on product quality compared with those of our competitors	0.535
KMO and Bartlett's Test	
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	0.799
Bartlett's Test of Sphericity, Approx. Chi-Square	623.32
Df	10
Sig.	0.000
Total Variance Explained	
Total	3.355
% of Variance	67.096
Cumulative %	67.096

Extraction Method: Principal Component Analysis.

Source: (Survey Data, 2023)

4.3.2 Factor Analysis for Green Supply Chain Management Practices

All of the constructions relevant to green supply chain management methods are shown in Table 4.4's principal component matrix, which shows how the factors were loaded using the varimax rotation method. The study also included the Bartlett's Test of Sphericity and the Kaiser-Meyer-Olkin Measure of Sampling Adequacy in Table 4.4. The Bartlett's Test of Sphericity, as shown in the table, produced a significant Chi-Square (2) of 3346.79 with a p-value of .000.05. Additionally, the data was adequate for factor analysis on this variable of green supply chain management practices since the Kaiser-Meyer-Olkin measure of sampling adequacy was 0.559, which was higher than the acceptable value of 0.5. This was in line with what Leech et al., 2013; Morgan et al. (2012) had discovered.

As shown in Table 4.4, three components were obtained using Varimax rotation after the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy indicated that the data was suitable for factor analysis. The table also included the total variation that the components explained. Indicating that the items were suitable for describing the variable, the exploratory factor analysis (EFA) recovered three factors with total extracted variance of 26.435%, 45.996%, and 60.261%, respectively. Additionally, every other item aside from the two that were eliminated had factor loading scores above Hair et al., (2014) minimum recommended value of 0.5. They were therefore kept around for more investigation.

Table 4.4: Factor Analysis of Green Supply Chain Management Practices

	GPUR	GP	GM
The firm collaborate with supplies in designing products which are environmental friendly			0.758
The firm use recycled material in their manufacturing process			0.753
The firm uses green energy in its manufacturing process			0.718
The firm has effective mechanisms that control emission of harmful gases to the environment during process of productions			0.814
The firm recycles internal waste generated during manufacturing process			0.711
Reduction in pollution by contracting firms that observe environmentally friendly principles or EMS certified	dropped		
The firm contract firms who adhere to environmental rules and are EMS certified during manufacturing process			0.684
The firm practices Safe disposal of non-recyclable waste (especially hazardous waste)			0.754
The firm use environmental friendly material for packaging		0.637	
The firm collaborate with its distributors/vendors in adhering to environmental friendly rules when packaging		0.736	
The use environmental friendly warehouse for storing it packaged products		0.814	
The firm labels their packaged product with a notice on customer son how to handle, use and dispose the products		0.672	
The company has adopted Eco-labeling to describe the information of a product about the environmental impact		0.671	
The firm use recycle material for packaging to reduce disposal of packaging material by using materials with recyclable contents		0.749	
The firm purchase products/raw materials from supplier who adhere to environmental standards and are EMS certified	0.725		
The firm select supplier who have the capacity to develop materials which are environmentally friendly	0.663		
The firm purchases material that can be recycled	0.704		
The firm purchases products that are packaged with bio degradable materials	0.569		
The firm use materials which are less toxic and hazardous through it purchasing process such as electronic received, order and payment	dropped		
KMO and Bartlett's Test			
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	0.559		
Bartlett's Test of Sphericity, Approx. Chi-Square	3346.79		
Df	171		
Sig.	0.000		
Total Variance Explained			
Total	5.023	3.717	2.71
% of Variance	26.435	19.562	14.265
Cumulative %	26.435	45.996	60.261

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

Source: (Survey Data, 2023)

4.3.3 Factor Analysis for Information Sharing

The study performed a factor analysis on the sharing of information and displayed its results in table 4.5. The sampling adequacy was evaluated using the Kaiser-Meyer-Olkin (KMO) Measure of sampling adequacy. The KMO value above 0.5 (0.753), as

shown in the table (Hair et al., (2010). The Bartlett's Test also had a significant p-value of .000, $2(21) = 1012.63$. According to the findings, information sharing had a single element that explained 58.636% of the variance. In addition, one item with a low factor loading was deleted, leaving six out of seven items with factor loadings over the suggested value of 0.50 (Hair et al., 2014). Five items that had substantial factor loading were thus kept for additional analysis to clarify information sharing.

Table 4.5: Factor Analysis of Information Sharing

	Loadings
The firm regularly shares accurate and integrated information with our suppliers	dropped
The firm promptly sends any document upon supplier request	0.842
Our supplier easily share information with us upon request	0.854
The firms' gives immediate feedback to supplier on products delivered	0.869
The firm ensure their regular and effective communication with its suppliers	0.883
The firm conducts periodic meetings with suppliers to address their views and or problems	0.857
The firm ensures that both parties are regularly informed about events or changes that may affect the other party	0.560
KMO and Bartlett's Test	
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	0.753
Bartlett's Test of Sphericity, Approx. Chi-Square	1012.63
Df	21
Sig.	0.000
Total Variance Explained	
Total	4.105
% of Variance	58.636
Cumulative %	58.636

Extraction Method: Principal Component Analysis.

Source: (Survey Data, 2023)

4.4 Reliability Analysis

The study generated Cronbach's Alpha tables as well as principal component analysis so as to enhance the reliability of the instruments. The study considered Cronbach's Alpha coefficient of 0.7 and above, Hair *et al.* (2010) recommends that composite reliability values larger than .70 as sufficient for data collection to proceed. The questionnaire items that did not attain the threshold were dropped or edited. The

findings on Table 4.6 indicate that firm performance had a coefficient of 0.826, green manufacturing had a coefficient of 0.847, green packaging had a coefficient of 0.933, and green purchasing had a coefficient of 0.920 while information sharing had a coefficient of 0.840. All the constructs depicted that the value of Cronbach's Alpha was greater than 0.7 and thus, the study constructs were reliable. Hair *et al.* (2010) recommends that composite reliability values should be larger than .70.

Table 4.6: Reliability Analysis

Variables	Cronbach's Alpha	N of Items
Firm performance	0.826	7
Green manufacturing	0.847	6
Green packaging	0.933	5
Green purchasing	0.920	4
Information sharing	0.840	6

Source: (Survey Data, 2023)

4.5 Descriptive Statistics

4.5.1 Descriptive Statistics for Green Manufacturing

The study aimed to examine the impact of green manufacturing on the performance of manufacturing firms in Nairobi County, Kenya. This was done to reveal the extent of adoption and differences in green supply chain practices among these firms. Based on the results presented in Table 4.7, it was found that firms collaborate with suppliers to create environmentally friendly products (mean=3.961, SD=0.663) and use recycled materials during manufacturing (mean=3.976, SD=0.653). They also implement green energy in their operations to a considerable extent (mean=4.020, SD=0.760) and tend to work with environmentally compliant and EMS-certified contractors during production (mean=4.020, SD=0.542). However, these firms might not have effective strategies in place for controlling harmful gas emissions during manufacturing

(mean=3.854, SD=0.670). Despite this, they do recycle internal waste generated in their processes (mean=3.956, SD=0.702) and practice safe disposal of non-recyclable waste, particularly hazardous waste (mean=4.010, SD=0.610). Overall, the firms in Nairobi County have a relatively high level of green supply chain management practices in their manufacturing processes with low variation among these practices (3.967, SD=0.468). All values for skewness value were less than 3 indicating a perfectly symmetrical distribution. Kurtosis was less than indicates a normal distribution. Positive kurtosis values indicate a distribution with heavier tails and a more peaked shape, while negative kurtosis values indicate a distribution with lighter tails and a flatter shape.

Table 4.7: Descriptive Statistics for Green Manufacturing

n=205	Std.		Skewness	Kurtosis
	Mean	Deviation		
The firm collaborate with supplies in designing products which are environmentally friendly	3.961	0.663	-0.569	1.029
The firm use recycled material in their manufacturing process	3.976	0.653	0.024	-0.628
The firm uses green energy in its manufacturing process	4.020	0.760	-0.033	-1.262
The firm has effective mechanisms that control emission of harmful gases to the environment during process of productions	3.854	0.670	0.179	-0.779
The firm recycles internal waste generated during manufacturing process	3.956	0.702	-0.454	0.407
The firm contract firms who adhere to environmental rules and are EMS certified during manufacturing process	4.020	0.542	-1.104	4.833
The firm practices Safe disposal of non-recyclable waste (especially hazardous waste)	4.010	0.610	-0.789	2.391
green manufacturing	3.967	0.468	-0.739	1.313

Source: (Survey Data, 2023)

4.5.2 Descriptive Statistics for Green Packaging

The study investigated the use of green packaging practices by manufacturing companies in Nairobi County, Kenya. The findings in table 4.8 showed that companies generally utilized eco-friendly packaging materials (Mean = 3.863, SD = 0.679) and collaborate with distributors/vendors in adhering to environmentally friendly rules when packaging (Mean = 3.873, SD = 0.763). Additionally, companies displayed a strong preference for using environmentally friendly warehouses for storage (Mean = 4.088, SD = 0.800) and adopting eco-labeling to inform customers about the environmental impact of their products (Mean = 4.181, SD = 0.768). Besides, firms label their packaged product with a notice on customer son how to handle, use and dispose the products (Mean = 3.883, SD = 0.878). Companies also prefer using recyclable materials for packaging (Mean = 3.971, SD = 0.678).

Overall, the study found that manufacturing firms in Nairobi County, Kenya, demonstrated high levels of green packaging practices in various aspects (Mean = 3.999, SD = 0.611), although individual scores varied. These findings offer valuable insights into the current state of green packaging practices among these companies and reveal a positive trend towards environmentally sustainable packaging solutions. Nonetheless, the results also suggest that there is potential for further improvement in certain areas. All values for skewness value were less than 3 indicating a perfectly symmetrical distribution. Kurtosis was less than indicates a normal distribution. Positive kurtosis values indicate a distribution with heavier tails and a more peaked shape, while negative kurtosis values indicate a distribution with lighter tails and a flatter shape

Table 4.8: Descriptive Statistics for Green Packaging

n=205	Std.		Skewness	Kurtosis
	Mean	Deviation		
The firm use environmentally friendly material for packaging	3.863	0.679	-0.393	0.409
The firm collaborate with its distributors/vendors in adhering to environmentally friendly rules when packaging	3.873	0.763	-0.718	0.620
The use environmentally friendly warehouse for storing it packaged products	4.088	0.800	-0.799	0.499
The firm labels their packaged product with a notice on customer son how to handle, use and dispose the products	3.883	0.878	-0.647	-0.106
The company has adopted Eco-labeling to describe the information of a product about the environmental impact	4.181	0.768	-0.649	-0.054
The firm use recycle material for packaging to reduce disposal of packaging material by using materials with recyclable contents	3.971	0.678	-0.536	0.811
Green packaging	3.999	0.611	-0.744	-0.047

Source: (Survey Data, 2023)

4.5.3 Descriptive Statistics for Green purchasing

The study aimed to determine the impact of green purchasing practices on the performance of manufacturing firms in Nairobi County, Kenya. The results, as shown in Table 4.9, indicate a strong commitment to environmental sustainability across various practices. Firms prefer purchasing products packaged with biodegradable materials (mean = 4.224, SD = 0.713), showcasing a focus on waste reduction. They also tend to source products or raw materials from environmentally responsible suppliers with EMS certification (mean = 4.054, SD = 0.787), ensuring supply chain compliance with environmental standards.

Moreover, firms prioritize suppliers capable of developing eco-friendly materials (mean = 3.966, SD = 0.723), minimizing negative environmental impacts. This is further supported by their value for purchasing recyclable materials (mean = 3.785, SD = 0.716), emphasizing resource conservation and waste reduction. Overall, green purchasing practices have an average rating of 3.997 with a standard deviation of 0.542, highlighting the commitment of Nairobi County manufacturing firms to environmental sustainability in their operations. All values for skewness value were less than 3 indicating a perfectly symmetrical distribution. Kurtosis was less than indicates a normal distribution. Positive kurtosis values indicate a distribution with heavier tails and a more peaked shape, while negative kurtosis values indicate a distribution with lighter tails and a flatter shape.

Table 4.9: Descriptive Statistics for Green purchasing

n=205	Mean	Std. Deviation	Skewness	Kurtosis
The firm purchase products/raw materials from supplier who adhere to environmental standards and are EMS certified	4.054	0.787	-0.461	-0.329
The firm select supplier who have the capacity to develop materials which are environmentally friendly	3.966	0.723	-0.733	0.985
The firm purchases material that can be recycled	3.785	0.716	-0.953	1.107
The firm purchases products that are packaged with biodegradable materials	4.224	0.713	-0.357	-0.981
Green purchasing	3.997	0.542	-1.238	1.275

Source: (Survey Data, 2023)

4.5.4 Descriptive Statistics for Information Sharing

The study aimed to investigate information sharing practices among manufacturing firms in Nairobi County, Kenya, revealing several key aspects of their information-sharing behavior. Suppliers readily share information with firms upon request (mean = 4.337, SD = 0.779), suggesting a high level of trust and cooperation between the firms and their suppliers. Firms provide immediate feedback to suppliers regarding product deliveries (mean = 4.298, SD = 0.763), indicating active engagement to ensure timely and accurate communication about product performance and requirements. Additionally, firms quickly share requested documents with suppliers (mean = 4.181, SD = 0.793), reflecting a commitment to transparent and efficient communication.

Firms also hold regular meetings with suppliers to address concerns and issues (mean = 4.073, SD = 0.846), demonstrating a proactive approach to problem-solving and maintaining strong supplier relationships. Both parties consistently inform each other about relevant events and changes (mean = 4.063, SD = 0.793), highlighting the firms' emphasis on maintaining open communication channels to adapt to changing circumstances and minimize potential disruptions. Lastly, firms maintain regular and

effective communication with suppliers (mean = 4.063, SD = 0.858), signifying an overall commitment to strong communication, which contributes to successful partnerships and supply chain management. In summary, the findings show that information sharing among Nairobi's manufacturing firms is characterized by trust, cooperation, and effective communication (mean = 4.135, SD = 0.599), promoting overall business success and supply chain efficiency. All values for skewness value were less than 3 indicating a perfectly symmetrical distribution. Kurtosis was less than indicates a normal distribution. Positive kurtosis values indicate a distribution with heavier tails and a more peaked shape, while negative kurtosis values indicate a distribution with lighter tails and a flatter shape

Table 4.10: Descriptive Statistics for Information Sharing

n=205	Mean	Std. Deviation	Skewness	Kurtosis
The firm promptly sends any document upon supplier request	4.181	0.793	-1.584	4.266
Our supplier easily share information with us upon request	4.337	0.779	-0.920	0.061
The firms' gives immediate feedback to supplier on products delivered	4.298	0.763	-1.163	1.486
The firm ensure their regular and effective communication with its suppliers	4.063	0.858	-0.781	0.129
The firm conducts periodic meetings with suppliers to address their views and or problems	4.073	0.846	-1.171	2.208
The firm ensures that both parties are regularly informed about events or changes that may affect the other party	4.063	0.793	-1.068	1.369
Information sharing	4.135	0.599	-1.470	2.181

Source: (Survey Data, 2023)

4.6 Descriptive Statistics on Firm Performance

This section of the analysis presents findings on the firm's performance, revealing its competitive edge in several aspects. From the findings in table 4.11, the firm has experienced more rapid growth in total sales than its main competitors (mean = 4.107, SD = 0.979), implying a strong market presence and effective sales strategies. Also, the higher level of customer loyalty (mean = 4.039, SD = 0.772) suggests that the firm has successfully built and maintained strong relationships with its customers, leading to increased repeat business and long-term success. Furthermore, the firm has outperformed its competitors in new product development (mean = 3.922, SD = 0.957), indicating its ability to innovate and adapt to changing market demands. Additionally, the firm has achieved higher customer satisfaction with regards to product quality compared to its competitors (mean = 3.80, SD = 1.109), reflecting the value and quality it delivers to its customers. Overall, the findings on firm performance, with a mean score of 3.958 and a standard deviation of 0.725, demonstrate the firms' superior performance and competitive edge in the market, which can lay the groundwork for

future growth and success. All values for skewness value were less than 3 indicating a perfectly symmetrical distribution. Kurtosis was less than indicates a normal distribution. Positive kurtosis values indicate a distribution with heavier tails and a more peaked shape, while negative kurtosis values indicate a distribution with lighter tails and a flatter shape

Table 4.11: Firm Performance

n=205	Std.		Skewness	Kurtosis
	Mean	Deviation		
Total sales have grown faster than that of our main competitors	4.107	0.979	-1.672	3.063
There is a higher level of customer loyalty with our customers	4.039	0.772	-1.099	1.621
We have achieved new product development than our main competitors	3.922	0.957	-0.996	1.041
Market share has increased faster than that of our main competitors	3.854	0.785	-0.719	0.480
We have achieved better customer satisfaction on product quality compared with those of our competitors	3.800	1.109	-1.035	0.625
Firm Performance	3.958	0.725	-1.360	1.715

Source: (Survey Data, 2023)

4.7 Assumption of Regression Model

To confirm that the assumptions of regression model were met, this research did normality, linearity, multicollinearity, and homoscedasticity diagnostic tests. This was necessary to ensure that statistical models work effectively. Outliers in statistical models adversely affect the model's efficiency

4.7.1 Normality

This study performed normality tests using the widely used Shapiro-Wilk methods to make sure the data were appropriate for multivariate analysis (Ghasemi & Zahediasi 2012; Garson, 2012). Table 4.12's results demonstrate that the data's normality was not in question because the S-W tests for each variable were not significant. As a result,

multivariate analysis was found appropriate for the data distribution in this investigation.

Table 4.12: Normality Test

	Shapiro-Wilk		Sig.
	Statistic	df	
Unstandardized Residual	0.994	201	0.611
Standardized Residual	0.994	201	0.611
Studentized Residual	0.994	201	0.611

Source: (Survey Data, 2023)

4.7.2 Multicollinearity

When the independent variables have a high correlation with one another, multicollinearity occurs. The correlation matrix, which calculates the Pearson's bivariate correlations among all independent variables, is one of the approaches available to test for multicollinearity. The magnitude of the correlation coefficients must be less than 0.80 to rule out multicollinearity. The variation Inflation Factor (VIF), another technique, shows how much the variation in regression estimates rises as a result of multicollinearity. When VIF values above 10, multicollinearity is likely to be present. Furthermore, multicollinearity is indicated by tolerance values of less than 0.1. The findings in Table 4.13 showed that all of the independent variables' VIF values were under 10. In light of this, there was no proof of multicollinearity for all predictor variables.

Table 4.13: Multicollinearity

	Collinearity Statistics	
	Tolerance	VIF
Green manufacturing	0.833	1.201
Green packaging	0.547	1.829
Green purchasing	0.333	2.999
Information sharing	0.373	2.684

Source: (Survey Data, 2023)

4.7.3 Linearity Test

ANOVA is one of many tests offered by SPSS that is capable of being used to evaluate the linearity assumption (Field, 2009; Garson, (2012). According to the general rule, an ANOVA's p-value of less than 0.05 indicates that the correlation between independent variables is linear, and a p-value of more than 0.05 indicates that the association deviates from linearity (Hair et al., 2010).

According to table 4.14, which summarizes the results of the linearity tests, there is a linear relationship between firm performance and green manufacturing ($F = 259.751$, $p = .000$), green packaging ($F = 212.254$, $p = .000$), and green purchasing ($F = 199.727$, $p = .000$). The overall results indicate that all independent variables and the dependent variable (firm performance) have a substantial linear connection. This result shows that the linearity assumption is valid, allowing regression analysis to be used to establish the cause-and-effect relationship between the variables under consideration.

Table 4.14: Linearity Test

	ANOVA for linearity	
	F	Sig.
Firm performance * green manufacturing	259.751	0.000
Firm performance * green packaging	212.254	0.000
firm performance * green purchasing	199.727	0.000
firm performance * information sharing	317.001	0.000

Source: (Survey Data, 2023)

4.7.4 Heteroscedasticity Test

Homoscedasticity is the property of errors having an equal variance at all levels of independent variables (Williams et al., 2013). Levene's test, which assesses whether the variance of independent and dependent variables is equal, was employed in this work to determine heteroscedasticity. It is implied that the group variances are not homoscedastic and are therefore unequal or heteroscedastic if the p-value of the

Levene's test is statistically significant at $\alpha = 0.05$ (i.e., more than 0.05), which violates a fundamental tenet of linear regression models. Levene's statistic was used to calculate the p-values for each variable, and the results are displayed in Table 4.15. This shows that heteroscedastic is not a problem.

Table 4.15: Heteroscedasticity Test

	Levene Statistic	df1	df2	Sig.
Firm performance	5.170	3	201	0.102
Green manufacturing	0.834	3	201	0.476
Green packaging	1.336	3	201	0.263
Green purchasing	1.110	3	201	0.346
Information sharing	2.704	3	201	0.511

Source: (Survey Data, 2023)

4.8 Correlation Analysis

Correlation analysis is used to determine the relationship between two variables. The strength of the relationship is measured by the correlation coefficient, which can range from -1 to 1. A positive correlation means that the two variables move in the same direction, while a negative correlation means that they move in opposite directions. A correlation of 0 means that there is no relationship between the two variables. Table 4.16 illustrates the correlation results. From the findings in table 4.16, the relationship between green manufacturing and firm performance was found to be positive and significant, $\rho = 0.519$, $p\text{-value} < 0.01$. Furthermore, the relationship between green packaging and firm performance was found to be positive and significant, $\rho = 0.592$, $p\text{-value} < 0.01$. The findings also showed that the relationship between green purchasing and firm performance is positive and significant, $\rho = 0.772$, $p\text{-value} < 0.01$. Additionally, there was positive and significant correlation between information sharing and firm performance, $\rho = 0.707$, $p\text{-value} < 0.01$.

Table 4.16: Correlation Analysis

	Firm performance	Green manufacturing	Green packaging	Green purchasing	Information sharing
Firm performance	1				
Green manufacturing	.519**	1			
Green packaging	.592**	.272**	1		
Green purchasing	.772**	.408**	.247**	1	
Information sharing	.707**	.337**	.620**	.777**	1

** Correlation is significant at the 0.01 level (2-tailed).

Source: (Survey Data, 2023)

4.9 Regression Analysis

4.9.1 Model Summary

The model summary provides information about the model fit, including the R-squared value, the adjusted R-squared value, the F-statistic, and the p-value for the F-statistic. The R-squared value indicates the percentage of the variance in the dependent variable that is explained by the model. The adjusted R-squared value adjusts for the number of independent variables in the model. The F-statistic is a measure of how well the model fits the data. The p-value for the F-statistic is the probability that the model is a good fit for the data. Table 4.17 illustrates the model summary.

Table 4.17: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin- Watson
1	.813a	0.661	0.656	0.42519	1.672

a Predictors: (Constant), Green Purchasing, Green Manufacturing, Green Packaging

b Dependent Variable: Firm Performance

Source: (Survey Data, 2023)

The model summary of the regression model is presented in table 4.17. Based on the model, the combined prediction of all the variables (green purchasing, green manufacturing, green packaging) accounted for approximately 66.1% of the total variation in firm performance $R^2 = .661$, Adjusted $R^2 = .656$.

4.9.2 ANOVA Model

The ANOVA model is a statistical model that is used to analyze the variance in a data set. This model is used to explain the variation in the dependent variable by the independent variables. The model is also used to test the hypothesis that the means of the dependent variable are equal. Table 4.18 highlights the ANOVA model.

The ANOVA model showed that the joint prediction of all the independent variables as depicted in Table 4.18 above was statistically significant ($F = 130.508$, $p = .000$). Thus, the model was fit to predict firm performance using, green manufacturing, green packaging and green purchasing.

Table 4.18: ANOVA Model

	Sum of Squares	df	Mean Square	F	Sig.
Regression	70.781	3	23.594	130.508	.000b
Residual	36.338	201	0.181		
Total	107.119	204			

a Dependent Variable: firm performance

b Predictors: (Constant), green purchasing, green manufacturing, green packaging

Source: (Survey Data, 2023)

Table 4.19 displays the unstandardized coefficients and standardized coefficients resulting from a regression analysis. These coefficients provide information about the relationship between the independent variables (Green manufacturing, Green packaging, Green purchasing) and the dependent variable (firm performance). The coefficient for Green manufacturing is 0.377. This suggests that, on average, a one-unit

increase in Green manufacturing is associated with a 0.377 increase in firm performance. The coefficient for Green packaging is 0.186. This indicates that a one-unit increase in Green packaging is associated with a 0.186 increase in firm performance. The coefficient for Green purchasing is 0.765. This implies that a one-unit increase in Green purchasing is associated with a 0.765 increase in firm performance. The t-value assesses the statistical significance of each coefficient. The associated significance level (Sig.) indicates the probability of obtaining the observed results by chance. In this table, all coefficients have significant p-values ($p < 0.05$), indicating that the relationships between the independent variables and firm performance are statistically significant.

Table 4.19: Coefficients of Estimate

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	-1.332	0.292		-4.563	0.000
Green manufacturing	0.377	0.07	0.244	5.413	0.000
Green packaging	0.186	0.064	0.156	2.901	0.004
Green purchasing	0.765	0.076	0.572	10.072	0.000

a Dependent Variable: firm performance

Source: (Survey Data, 2023)

4.10 Moderating Effect of Information Sharing

The fourth objective of the study was to establish the moderating effect of information sharing on the relationship between green supply chain management practices and firm performance. In order to confirm the moderating role of information sharing, the following steps were carried out; first, the study standardized all variables to make interpretations easier afterwards and to avoid multicollinearity. Second, the study fitted a regression model (model 2) predicting the outcome variable firm performance from the green supply chain management practices (green purchasing, green manufacturing,

and green packaging). The effects as well as the model in general (R^2) should be significant. Third, the study added the interaction effect (Information Sharing* Green Supply Chain Management Practices) to the previous model (model 3, 4 and 5) and check for a significant R^2 change as well as a significant effect by the new interaction term. If both are significant, then moderation is occurring. If the predictor and moderator are not significant with the interaction term added, then complete moderation has occurred. If the predictor and moderator are significant with the interaction term added, then moderation has occurred (Marsh *et al*, 2013), however the main effects are also significant.

Model 1 includes three independent variable, GM with a coefficient of 0.24 and a standard error of 0.05, GP with a coefficient of 0.16 (S.E= 0.5), GPUR with a coefficient of 0.52 (S.E=0.4) The model's R-squared value is 0.629, indicating that approximately 62.9% of the variance in the dependent variable (Zscore(FP)) is explained by the GM, GP and GPUR. However, the coefficient is not statistically significant due to its standard error.

In Model 2, GM (Zscore), GP (Zscore), GPUR (Zscore) as independent variables and the moderator (IS) are included. Both variables show statistically significant coefficients with positive values. The coefficient for GM is 0.24 (S.E = 0.03), GP is 0.11 (S.E = 0.05), GPUR is 0.48 (S.E=0.5) while the coefficient for IS is 0.26 (S.E=0.5). The R-squared value increases slightly to 0.638, indicating that 63.8% of the variance in Zscore(FP) is now explained by the combination of the four independent variables GM, GP, GPUR and IS.

Moving to Model 3, an additional interaction variable that is GM*IS is introduced with a positive and statistically significant coefficient of 0.42 and standard error of 0.8. The

R-squared value increases to 0.747, meaning that approximately 74.7% of the variance in Zscore(FP) is now explained by the combined effect of four variables and the interaction term GM, GP, GPUR and GM*IS.

Model 4 expands on the previous model by adding another interaction variable, GP*IS with the coefficient of 0.34 (S.E=0.02) indicating a statistically significant positive relationship with Zscore(FP). The R-squared value increases to 0.806, suggesting that approximately 80.6% of the variance in Zscore(FP) is explained by GM, GP, GPUR, IS, GM*IS and GP*IS.

Finally, Model 5 includes additional interaction variable GPUR*IS with coefficient of 0.65 (S.E=0.05). The coefficients for these interaction terms are all positive and statistically significant, indicating that the interaction between these variables has an impact on Zscore(FP). The R-squared value increases to 0.874, implying that approximately 87.4% of the variance in Zscore(FP) is explained by the full model, including the main effects and interaction terms.

Table 4.20: Moderating Effect of Information Sharing on Green Supply Chain Management Practices and Firm Performance

	Model 1	Model 2	Model 3	Model 4	Model 5
	B(S.E)	B(S.E)	B(S.E)	B(S.E)	B(S.E)
(Constant)	0.00(.04)	0.00(.07)	0.00(.01)	0.02(.02)	0.02(.02)
Zscore(GM)	0.24 (.05)	0.24(.03)*	0.31(.06)*	0.29(.49)*	0.27(.01)**
Zscore(GP)	0.16(.05)**	0.11(.05)*	0.13(.07)	0.15(.05)**	0.15(.04)**
Zscore(GPUR)	0.52(.04)**	0.48(.05)**	0.57(.06)**	0.56(.05)**	0.57(.09)**
Zscore(IS)		0.26(.05)*	0.75(.04)*	0.35(.02)*	0.71(.04)**
Zscore(GM*IS)			0.42(.08)**	0.42(.09)**	0.43(.09)*
Zscore(GP*IS)				0.34(.02)**	0.35(.05)**
Zscore(GPUR*IS)					0.65(.05)**
Model Summary Statistics					
R	0.793	0.799	0.864	0.898	0.935
R Square	0.629	0.638	0.747	0.806	0.874
Adjusted R Square					
S.E of the Estimate	0.624	0.632	0.742	0.801	0.871
Change Statistics					
R Square Change	-	0.009	0.109	0.059	0.069
F	148.381	6.515	112.717	78.644	141.741

a Dependent Variable: Zscore(FP)

Source: (Survey Data, 2023)

4.11 Hypothesis testing

Hypothesis 1(H₀₁) stated that green manufacturing has no significant effect on performance of manufacturing firms in Nairobi County, Kenya. Findings showed that green manufacturing had coefficients of estimate which was significant basing on $\beta_1 = 0.244$ (p-value = 0.000 which is less than $\alpha = 0.05$). The null hypothesis was thus rejected, and it was concluded that green manufacturing had a significant effect on firm performance. This suggested that there was an up to 0.244 unit increase in firm performance for each unit increase in green manufacturing.

Hypothesis 2 (H₀₂) stated that green packaging has no significant effect on performance of manufacturing firms in Nairobi County, Kenya. However, research findings showed that green packaging had coefficients of estimate which were significant basing on $\beta_2 = 0.156$ (p-value = 0.004 which was less than $\alpha = 0.05$) hence

the null hypothesis was rejected. This indicated that for each unit increase in green packaging, there was a 0.156 unit increase in firm performance.

Hypothesis 3 (H₀₃) postulated that green purchasing has no significant effect on performance of manufacturing firms in Nairobi County, Kenya. Findings showed that green purchasing had coefficients of estimate which was significant basing on $\beta_3 = 0.572$ (p-value = 0.000 which is less than $\alpha = 0.05$) implying that the null hypothesis was rejected, and it was concluded that green purchasing had significant effect on firm performance. This indicated that for each unit increase in green purchasing, there was an up to 0.572 unit increase in firm performance.

The hierarchical regression results are presented in Model 1 to 5 in Table 4.20.

H_{04a} stated that information sharing does not moderate the relationship between green manufacturing and firm performance. However, the findings indicated that information sharing moderate the relationship between green manufacturing and firm performance ($\beta = .42, p < .05$). So, the null hypothesis was rejected. This was also confirmed by $R^2\Delta$ of .109 which indicate that information sharing moderates the relationship between green manufacturing and firm performance by 10.9%. The implication is that the more information is shared within the firm about green manufacturing practices, the stronger the relationship will be between green manufacturing and firm performance.

H_{04b} predicted that information sharing does not moderate the relationship between green packaging and firm performance. However, the regression results showed a positive and significant moderating effect of information sharing on the relationship between green packaging and firm performance ($\beta = .34, p < .05$). Hence, the null hypothesis was rejected. This was also supported by change of R squared of 5.9% ($R^2\Delta = .059$) indicating that information sharing moderate the relationship between

green packaging and firm performance by 5.9%. This implies that when firms engage in information sharing, the positive impact of green packaging on firm performance is enhanced. Therefore, firms that prioritize green packaging initiatives and promote information sharing within their organization, may experience improved performance outcomes.

H04c stated that information sharing does not moderate the link between green purchasing and firm performance. However, the regression results showed information sharing positively moderated the relationship between green purchasing and firm performance ($\beta = 0.65, p < .05$), rejecting the null hypothesis. The moderating effect was also revealed by change in R squared ($R^2 \Delta .069$) and F change ($F \Delta = 141.741$) This suggests that firms that engage in green purchasing practices and have a culture of information-sharing tend to perform better than those who do not. This finding also suggests that communication and collaboration among stakeholders regarding sustainability practices can lead to improved firm performance.

4.12 Modgraphs

The research employed modgraph, (Jose, 2008), in order to demonstrate both antagonistic and enhancing moderating effects. The study adhered to the guidelines of Aiken and West (1991) by utilizing a moderation graph to investigate the interaction between the variables of interest, specifically information sharing, across varying levels of the moderator. Figure 4.1 demonstrated that higher levels of information sharing brought about a steeper slope between green manufacturing and firm performance, hence, the null hypothesis 4a was not supported. This implied that information sharing positively and significantly moderates the relationship between green manufacturing and firm performance. The findings in figure 4.1 indicate an enhancing moderation

effect where increased levels of information sharing result to increased effect of green manufacturing on firm performance.

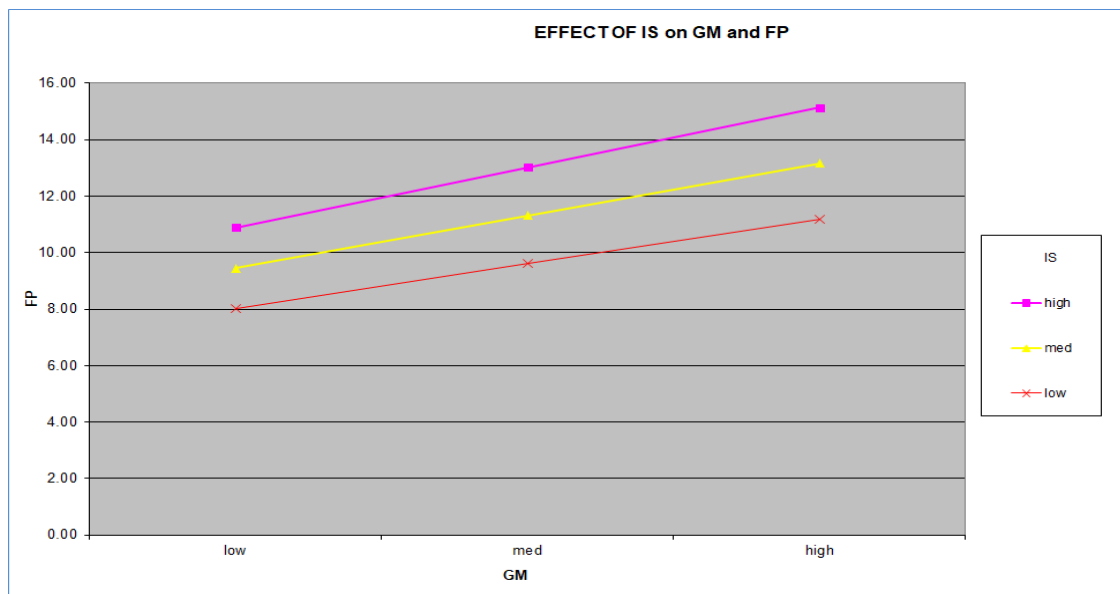


Figure 4.1: Modgraph for Moderating Effect of Information Sharing on Green Manufacturing and Firm Performance

The graph in Figure 4.2 revealed that when the firms has high levels of information sharing, green packaging contributes more to firm performance compared to when there are low levels of information sharing, as shown by the steepness of the slope. So, the null hypothesis 4b was rejected. Thus, information sharing positively and significantly moderate the relationship between green packaging and firm performance.

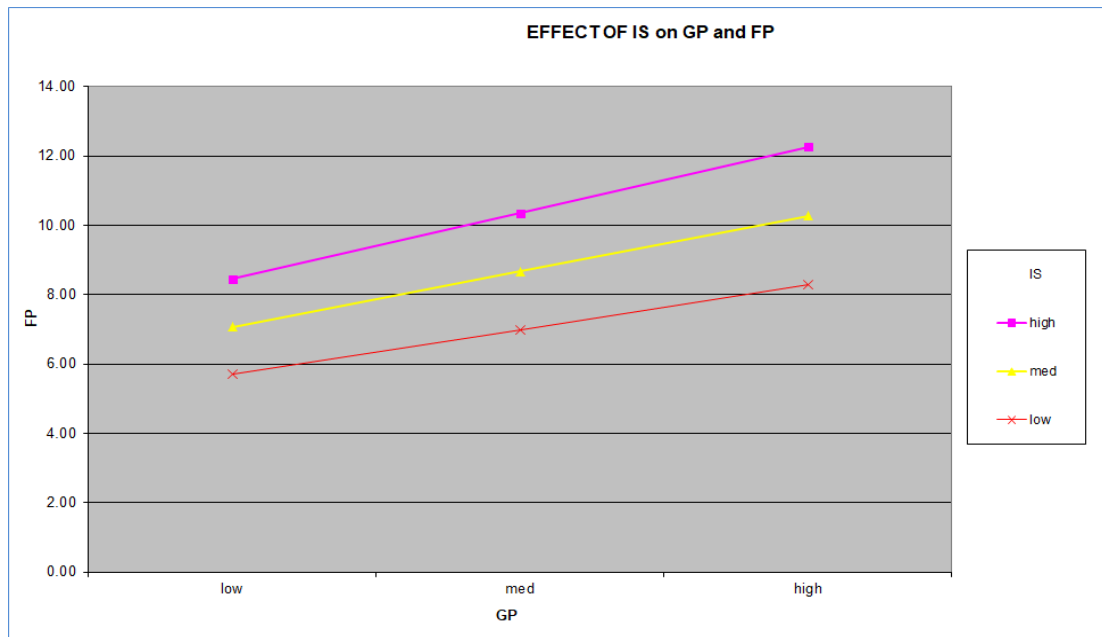


Figure 4.2: Modgraph for Moderating Effect of Information Sharing on Green Packaging and Firm Performance

The interaction plot in Figure 4.3 displays an enhancing effect that as information sharing increases, the effect of green purchasing on firm performance increases as well, as depicted by the steepness of the slope. Hypothesis 4c was therefore rejected. Thus, information sharing positively and significantly moderate the relationship between green purchasing and firm performance.

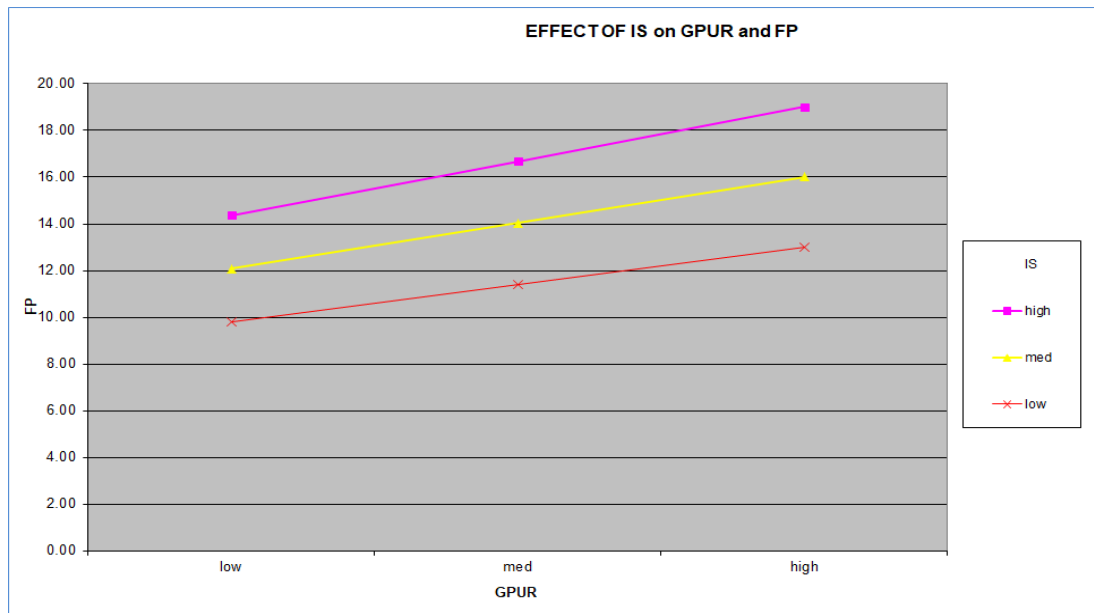


Figure 4.3: Modgraph for Moderating Effect of Information Sharing on Green Purchasing and Firm Performance

4.13 Summary of Hypotheses Testing Results

The results presented in Table 4.21 below indicated the summary of both multiple and hierarchical regression models. Thus, the table shows (R^2) and Δ in (R^2) for both main and interaction effects as well as the decision on the formulated hypothesis.

Table 4.21: Summary of Hypotheses Testing Results

Hypothesis Formulated	Beta (β)	ρ – values	R ²	Decision
Main Effects				
H₀₁: There is no statistically significant influence of green manufacturing on firm performance	0.244	0.000		Rejected
H₀₂: There is no statistically significant influence of green packaging on firm performance	0.156	0.004		
H₀₃: There is no statistically significant influence of green purchasing on firm performance	0.572	0.000		
			0.661	Rejected
Moderation – information sharing	Beta (β)	ρ – value s	R²Δ	
H_{04a}: Information sharing does not moderate the relationship between green manufacturing and firm performance	0.42	0.000	.109	Moderate d
H_{04b}: Information sharing does not moderate the relationship between green packaging and firm performance	0.34	0.000	0.059	Moderate d
H_{04c}: Information sharing does not moderate the relationship between green purchasing and firm performance	0.65	0.000	0.069	Moderate d

4.14 Discussion of Findings

Regarding the regression findings, there was a positive relationship between green manufacturing and firm performance, with a 0.244 unit increase in firm performance for each unit increase in green manufacturing. Consistently, Shivastava & Shivastava (2016) established that adopting structured energy use and eco-friendly production practices in India not only reduced costs but also minimized negative environmental impacts. In the same way, Mbohwa and Fore (2014) found that manufacturing firms that implemented green methods and processes, such as bucket transportation, experienced a reduction in raw material waste and environmental emissions. The study findings also align with those of Eshikumo (2017) which revealed that green manufacturing practices, such as energy efficiency and waste reduction in cement

manufacturing, contribute to lowering production costs and enhanced firm performance. Notably, the extant literature supports the notion that eco-friendly practices lead to reduced costs, minimized environmental impacts, and improved overall performance.

Regarding the regression findings, there is a positive relationship between green packaging and firm performance. The result aligns with the studies by Sing et al., (2016) and Hasan (2013), which emphasize the benefits of reusable packaging systems and minimizing packaging waste. These practices have been widely adopted by firms to reduce product damage, solid waste, and safety issues while also enhancing environmental sustainability and overall firm performance. These highlight the importance of environmentally friendly practices for overall business success.

Furthermore, the regression analysis findings highlight a positive relationship between green purchasing and firm performance. The study findings align with prior literature, as Maan & Faris, 2020; Okoumba & Mafini, () highlight that green purchasing contributes to a competitive edge and positively impacts firm performance. Similarly, Carter et al., (2000) emphasizes the cost and environmental benefits of green purchasing that also enhances firm image. Geng et al., 2017; Chen (2005) suggest that green purchasing not only acts as an efficient pollution control mechanism but also plays a crucial role in improving firm performance and reputation in a competitive environment.

The findings from the hierarchical regression indicated that information sharing positively moderates the relationship between green manufacturing and firm performance. This implies that when companies foster a culture of information sharing regarding green manufacturing practices, they can experience improved performance

outcomes. Consequently, effective communication and collaboration within the company on sustainability practices in green manufacturing play a crucial role in enhancing firm performance. The study's findings are consistent with Chen et al. (2000), who highlighted the importance of information sharing in minimizing ambiguity in demand and supply, consequently enhancing the competitiveness of firms in the supply chain.

Similarly, information sharing positively moderated the relationship between green packaging and firm performance. The positive and significant moderating effect of information sharing demonstrates that firms that prioritize green packaging initiatives and promote information sharing within their organization may experience improved performance outcomes. Therefore, companies should actively share information related to green packaging practices to improve their performance. The study findings support Calanone et al., (2002) by demonstrating that information sharing plays a significant role in enhancing firm performance. By sharing information, firms can maximize the benefits of green packaging, leading to better performance, while simultaneously reducing the learning exertion required.

Further, the regression results showed a positive moderating effect, where firms engaging in green purchasing practices and having a culture of information-sharing tend to perform better than those who do not. This finding suggests that communication and collaboration among stakeholders regarding green purchasing sustainability practices can improve firm performance. Consistently, Vallopra and McGinnis (1999) emphasized the competitive advantage of timely and accurate information sharing, highlighting its importance as a differentiating element. Similarly, Balsmeier and Voisin 1996; Towill (2003) stated that distributing up-to-date information among supply chain parties leads to competitive benefits. These insights align with the study's

conclusion that information sharing positively moderates the relationship between green packaging and firm performance, further emphasizing the need for effective communication in achieving sustainability goals.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECCOMENDATIONS

5.1 Introduction

This chapter offers the summary of the findings, alongside a thorough discussion and conclusions drawn from the analyzed results. Based on these conclusions, well-grounded recommendations are proposed for policymakers. Furthermore, the chapter concludes by suggesting potential future research avenues that can contribute to the existing body of knowledge and offer valuable insights that complement and enhance the current study.

5.2 Summary of Findings

The primary objective of this study was to establish the moderating effect of information sharing on the relationship between green supply chain management practices and firm performance of manufacturing firms in Nairobi County, Kenya. The research examined four hypotheses, proposing that green manufacturing, green packaging and green purchasing do not significantly affect firm performance. The study also examined the moderating effect of information sharing on the relationship between green supply chain management practices (green manufacturing, green packaging, and green purchasing) and firm performance. The following section presents a summary of the findings and a discussion in relation to existing literature.

5.2.1 Green manufacturing on firm performance

The study findings on green manufacturing revealed that the manufacturing firms adopt green supply chain practices such as collaborating with suppliers, using recycled materials, implementing green energy, and working with environmentally compliant contractors. However, controlling harmful gas emissions appears to be a challenge.

These firms recycle internal waste and safely dispose of hazardous waste. Overall, they have a high level of green supply chain management practices.

Regarding the regression findings, there was a positive relationship between green manufacturing and firm performance, with a 0.244 unit increase in firm performance for each unit increase in green manufacturing. Consistently, Shivastava and Shivastava (2016) established that adopting structured energy use and eco-friendly production practices in India not only reduced costs but also minimized negative environmental impacts. In the same way, Mbohwa and Fore (2014) found that manufacturing firms that implemented green methods and processes, such as bucket transportation, experienced a reduction in raw material waste and environmental emissions. The study findings also align with those of Eshikumo (2017) which revealed that green manufacturing practices, such as energy efficiency and waste reduction in cement manufacturing, contribute to lowering production costs and enhanced firm performance. Notably, the extant literature supports the notion that eco-friendly practices lead to reduced costs, minimized environmental impacts, and improved overall performance.

5.2.2 Green packaging on firm performance

The study findings show that Nairobi County manufacturing companies show a strong commitment to green packaging practices, including eco-friendly materials, collaboration with vendors, environmentally friendly storage, eco-labeling, and recyclable materials. Despite some variations in performance, there is a positive trend towards sustainable packaging solutions, while still pointing out potential for improvement.

Regarding the regression findings, there is a positive relationship between green packaging and firm performance. The result aligns with the studies by Sing et al., 2016; Hasan (2013), which emphasize the benefits of reusable packaging systems and minimizing packaging waste. These practices have been widely adopted by firms to reduce product damage, solid waste, and safety issues while also enhancing environmental sustainability and overall firm performance. These highlight the importance of environmentally friendly practices for overall business success.

5.2.3 Green purchasing on firm performance

The findings reveal that Nairobi County manufacturing firms are strongly committed to environmental sustainability through green purchasing practices, such as preferring biodegradable packaging, sourcing from environmentally responsible suppliers, developing eco-friendly materials, and purchasing recyclable materials. Overall, these practices indicate a focus on waste reduction, resource conservation, and adherence to environmental standards within the supply chain.

Furthermore, the regression analysis findings highlight a positive relationship between green purchasing and firm performance. The study findings align with prior literature, as Maan and Faris, 2020; Okoumba and Mafini () highlight that green purchasing contributes to a competitive edge and positively impacts firm performance. Similarly, Carter et al., (2000) emphasizes the cost and environmental benefits of green purchasing that also enhances firm image. Geng et al., 2017; Chen (2005) suggest that green purchasing not only acts as an efficient pollution control mechanism but also plays a crucial role in improving firm performance and reputation in a competitive environment.

5.2.4 Moderating effect of information sharing

The findings from the hierarchical regression indicated that information sharing positively moderates the relationship between green manufacturing and firm performance. This implies that when companies foster a culture of information sharing regarding green manufacturing practices, they can experience improved performance outcomes. Consequently, effective communication and collaboration within the company on sustainability practices in green manufacturing play a crucial role in enhancing firm performance. The study's findings are consistent with Chen et al., (2000), who highlighted the importance of information sharing in minimizing ambiguity in demand and supply, consequently enhancing the competitiveness of firms in the supply chain.

Similarly, information sharing positively moderated the relationship between green packaging and firm performance. The positive and significant moderating effect of information sharing demonstrates that firms that prioritize green packaging initiatives and promote information sharing within their organization may experience improved performance outcomes. Therefore, companies should actively share information related to green packaging practices to improve their performance. The study findings support Calanone et al., (2002) by demonstrating that information sharing plays a significant role in enhancing firm performance. By sharing information, firms can maximize the benefits of green packaging, leading to better performance, while simultaneously reducing the learning exertion required.

Further, the regression results showed a positive moderating effect, where firms engaging in green purchasing practices and having a culture of information-sharing tend to perform better than those who do not. This finding suggests that communication and collaboration among stakeholders regarding green purchasing sustainability practices

can improve firm performance. Consistently, Vallopra and McGinnis, (1999) emphasized the competitive advantage of timely and accurate information sharing, highlighting its importance as a differentiating element. Similarly, Balsmeier and Voisin, 1996; Towill (2003) stated that distributing up-to-date information among supply chain parties leads to competitive benefits. These insights align with the study's conclusion that information sharing positively moderates the relationship between green packaging and firm performance, further emphasizing the need for effective communication in achieving sustainability goals.

5.3 Conclusion

In conclusion, the study indicated that green manufacturing positively influences firm performance. The results highlighted information sharing as a vital factor in enhancing this relationship. The positive impact can partly be attributed to adopting green supply chain practices, such as collaborating with suppliers, using recycled materials, implementing green energy, and working with environmentally compliant contractors. However, it is crucial to address the challenge of controlling harmful gas emissions to improve this relationship further, as it is a potential area of concern.

Also, the study highlights the significant and positive impact of green packaging on firm performance, suggesting that the adoption and continuous improvement of environmentally friendly packaging practices contribute to the success of manufacturing companies. Additionally, the findings emphasize the importance of information sharing in strengthening the relationship between green packaging and firm performance. A more collaborative approach among stakeholders, facilitated by transparent communication, can lead to better outcomes and enhance overall performance.

Finally, the study demonstrated that green purchasing significantly impacts firm performance, particularly when supported by adequate information sharing. This finding highlights the importance of adopting green purchasing practices in manufacturing firms and fostering strong communication channels with environmentally responsible suppliers. By prioritizing eco-friendly materials, waste reduction, and resource conservation, manufacturing firms can enhance their environmental sustainability and improve overall performance.

5.4 Recommendations

5.4.1 Managerial and Policy Implications

Based on the findings, manufacturing firms in Nairobi County, Kenya should prioritize adopting green manufacturing practices and enhance information sharing among stakeholders. This includes strengthening collaboration with suppliers, increasing the use of recycled materials, implementing green energy, and working with environmentally compliant contractors. Additionally, firms should actively develop effective strategies for controlling harmful gas emissions. By focusing on these recommendations, manufacturing firms can achieve sustainable growth and enhanced performance and contribute to overall industry improvements.

Also, manufacturing firms should proactively adopt and continuously improve their green packaging practices to enhance their overall performance. Emphasis should be placed on information sharing and collaboration among stakeholders, including suppliers, distributors, and customers, to maximize the benefits of eco-friendly packaging. Companies should invest in transparent communication mechanisms to build strong relationships and promote awareness of environmental sustainability. By following these recommendations, firms can contribute to a greener and more sustainable future while improving their competitive edge in the market.

Finally, manufacturing firms need to adopt and implement green purchasing practices in their operations, with a focus on eco-friendly materials, waste reduction, and resource conservation. In addition, firms should seek partnerships with environmentally responsible suppliers and encourage them to obtain certifications such as EMS. Establishing effective information-sharing systems with these suppliers can further strengthen the relationship and enhance the positive impact on firm performance. By incorporating these strategies, organizations can contribute to environmental sustainability and improve their overall business performance, creating more competitive and responsible business environments.

5.4.2 Theoretical Implication

Findings resonate with the ecological modernization theory, which emphasizes the importance of integrating environmental concerns into economic and industrial processes. By actively sharing information and knowledge related to green practices, manufacturing firms can accelerate their ecological transformation and align their operations with sustainability goals. The study's conclusions highlight the significance of green manufacturing, green packaging, and green purchasing practices for enhancing firm performance and sustainability. It suggests that manufacturing firms in Nairobi County should prioritize these practices to improve their financial and operational performance. The study's recommendations align with the sustainability theory, which underscores the importance of balancing economic development with environmental protection and social well-being. The study provides empirical evidence that supports the positive impact of green practices on firm performance in manufacturing firms. It emphasizes the role of information sharing as a vital factor in enhancing the relationship between green practices and firm performance. These findings contribute to the existing body of knowledge on sustainability and align with relevant theoretical perspectives,

including the resource-based view theory, ecological modernization theory, and sustainability theory.

5.5 Further Research Recommendations

The primary objective of this study was to establish the moderating effect of information sharing on the relationship between green supply chain management practices and performance of manufacturing firms in Nairobi County, Kenya. Further research should focus on the role of government policies and incentives in promoting green manufacturing adoption. Moreover, future research could explore the impact of green packaging on consumer preferences and behavior and investigate the effectiveness of various communication strategies to enhance collaboration and awareness of environmentally friendly practices. Finally, future scholars could investigate how the integration of digital technologies and supply chain transparency can contribute to improved environmental sustainability and operational efficiency.

5.6 Limitations of the Study

The study was limited to manufacturing firms in Nairobi County, therefore it is necessary for upcoming researchers to undertake further research on all the manufacturing firms in the Kenyan context.

The study was limited to three independent variables for instance green manufacturing, green packaging and green purchasing hence it calls for further research to be done on other green practices by other scholars.

REFERENCES

- Abdul-Rashid, S. H., Sakundarini, N., Raja Ghazilla, R. A., & Thurasamy, R. (2017). The impact of sustainable manufacturing practices on sustainability performance: Empirical evidence from Malaysia. *International Journal of Operations & Production Management*, 37(2), 182-204.
- Ahmed, W., Ashraf, M. S., Khan, S. A., Kusi-Sarpong, S., Arhin, F. K., Kusi-Sarpong, H., & Najmi, A. (2020). Analyzing the impact of environmental collaboration among supply chain stakeholders on a firm's sustainable performance. *Operations Management Research*, 13(1), 4-21.
- Ajay, A., & Maharaj, M. (2010). Effects of information sharing within supply chains. *Proceeding to SACLA*.
- Al-Matari, E. M., Al-Swidi, A. K., & Fadzil, F. H. B. (2014). The measurements of firm performance's dimensions. *Asian Journal of Finance & Accounting*, 6(1), 24.
- Alzawawi, M. (2014). Drivers and obstacles for creating sustainable supply chain management and operations. In *ASEE Zone conference proceedings* (pp. 1-8).
- Angus, A. J., & Nellis, J. G. (2019). Sustainability in Business Economics. In *Incorporating Sustainability in Management Education* (pp. 55-81). Palgrave Macmillan, Cham.
- Annuar, N., Daud, D., Sabri, S. M., Rahman, N. L. A., Musairah, S. K., & Mutalib, H. A. (2022, September). Mediating Effect of Goal Acquisition on the Relationship between Personal Factor and Self-Directed Learning. In *Proceedings* (Vol. 82, No. 1, p. 46). MDPI.
- Aoki, M., & Takizawa, H. (2002). Information, incentives, and option value: the Silicon Valley model. *Journal of Comparative Economics*, 30(4), 759-786.
- Arboretti, R., & Bordignon, P. (2016). Consumer preferences in food packaging: CUB models and conjoint analysis. *British Food Journal*, 118(3), 527-540.
- Aydiner, A. S., Tatoglu, E., Bayraktar, E., Zaim, S., & Delen, D. (2019). Business analytics and firm performance: The mediating role of business process performance. *Journal of business research*, 96, 228-237.
- Bag, S., Wood, L. C., Xu, L., Dhamija, P., & Kayikci, Y. (2020). Big data analytics as an operational excellence approach to enhance sustainable supply chain performance. *Resources, conservation and recycling*, 153, 104559.
- Baker, S. G. (1994) Composite linear models for incomplete categorical data. *Statist. Med.*, 13, 609–622.
- Balloun, J. L., Barrett, H., & Weinstein, A. (2011). One is not enough: The need for multiple respondents in survey research of organizations. *Journal of Modern Applied Statistical Methods*, 10(1), and 26.
- Balsmeier, P. W., & Voisin, W. J. (1996). Supply chain management: A time-based strategy. *Industrial Management*, 38(5).

- Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of management*, 17(1), 99-120.
- Bedi, H. S. (2019). Innovativeness, business performance and environmental uncertainty: a multivariate configuration. *International Journal of Business Innovation and Research*, 18(3), 328-345.
- Bhanot, N., Rao, P. V., & Deshmukh, S. G. (2015). Enablers and barriers of sustainable manufacturing: results from a survey of researchers and industry professionals. *Procedia Cirp*, 29, 562-567.
- Brockgreitens, J., & Abbas, A. (2016). Food Packaging Technologies. In *Food Engineering* (pp. 129-144). Apple Academic Press.
- Cadez, S., & Guilding, C. (2008). An exploratory investigation of an integrated contingency model of strategic management accounting. *Accounting, organizations and society*, 33(7-8), 836-863.
- Calsyn, R., & Winter, J. (2000). Who Attends Senior Centers? *Journal of Social Service Research - J SOC SERV RES*. 26. 53-69. 10.1300/J079v26n02_03.
- Carter, C. R., & Carter, J. R. (1998). Inter organizational determinants of environmental purchasing: initial evidence from the consumer products industries. *Decision Sciences*, 29(3), 659-684.
- Carter, C. R., Kale, R., & Grimm, C. M. (2000). Environmental purchasing and firm performance: an empirical investigation. *Transportation Research Part E: Logistics and Transportation Review*, 36(3), 219-228.
- Chu, S. H., Yang, H., Lee, M., & Park, S. (2017). The impact of institutional pressures on green supply chain management and firm performance: Top management roles and social capital. *Sustainability*, 9(5), 764.
- Cohen, R. J., & Swerdlik, M. E. (2005). Psychological Testing and Assessment: An Introduction to Tests and Measurement (6th ed.). New York: McGraw-Hill.
- Coleman, R., Thorson, E., & Wilkins, L. (2011). Testing the impact of public health framing and rich sourcing in health news stories. *Journal of Health Communication*, 16, 941 – 954.
- Connelly, L. M. (2008). Pilot studies. *Medsurg nursing*, 17(6), 411.
- Cosimato, S., & Troisi, O. (2015). Green supply chain management: Practices and tools for logistics competitiveness and sustainability. The DHL case study. *The TQM Journal*, 27(2), 256-276.
- Creswell, J. W. (2013). *Qualitative inquiry and research design: Choosing among five approaches*. Thousand Oaks, CA: Sage
- Creswell, J. W., & Clark, V. L. P. (2017). *Designing and conducting mixed methods research*. Sage publications.

- Daley, B., Morgan, R., & Van Voorhis, K. (2007). Pre-Trial Proceedings in Patent Infringement Actions: A Comparison Among Canada, the United Kingdom, and the United States of America. *AIPLA QJ*, 35, 113.
- Das, D. (2017). Development and validation of a scale for measuring sustainable supply chain management practices and performance. *Journal of Cleaner Production*, 164, 1344–1362. doi:10.1016/j.jclepro.2017.07.006.
- Day, G. S., & Van den Bulte, C. (2002). *Superiority in customer relationship management: Consequences for competitive advantage and performance* (pp. 1-49). MSI.
- De Vaus, D.A. (1993), *Surveys in Social Research* (3rd edn.), London: UCL Press.
- Deif, A.M. (2011). A system model for green manufacturing, *Journal of Cleaner Production*, 19, (14) 1553-1559, ISSN 0959-6526, <https://doi.org/10.1016/j.jclepro.2011.05.022>.
- Devi Juwaheer, T., Pudaruth, S., & Monique Emmanuelle Noyaux, M. (2012). Analysing the impact of green marketing strategies on consumer purchasing patterns in Mauritius. *World Journal of Entrepreneurship, Management and Sustainable Development*, 8(1), 36-59.
- Digalwar, A. K., Mundra, N., Tagalpallewar, A. R., & Sunnapwar, V. K. (2017). Road map for the implementation of green manufacturing practices in Indian manufacturing industries: An ISM approach. *Benchmarking: An International Journal*, 24(5), 1386-1399.
- Dikolli, S. S. (2010). Nonfinancial Performance Measures and Physician Compensation. *Journal of Management Accounting Research*, 22(1), 57-64.
- Disney, S. M., & Towill, D. R. (2003). The effect of vendor managed inventory (VMI) dynamics on the Bullwhip Effect in supply chains. *International journal of production economics*, 85(2), 199-215.
- Dubey, R., Altay, N., Gunasekaran, A., Blome, C., Papadopoulos, T., & Childe, S. J. (2018). Supply chain agility, adaptability and alignment: empirical evidence from the Indian auto components industry. *International Journal of Operations & Production Management*, 38(1), 129-148.
- Dubey, R., Gunasekaran, A., Papadopoulos, T., Childe, S. J., Shibin, K. T., & Wamba, S. F. (2017). Sustainable supply chain management: framework and further research directions. *Journal of cleaner production*, 142, 1119-1130.
- El-Kassar, A. N., & Singh, S. K. (2019). Green innovation and organizational performance: The influence of big data and the moderating role of management commitment and HR practices. *Technological forecasting and social change*, 144, 483-498.
- Epoh, L. R., & Mafini, C. (2018). Green supply chain management in small and medium enterprises: Further empirical thoughts from South Africa. *Journal of Transport and Supply Chain Management*, 12(1), 1-12.

- Eshikumo, S. M., & Odock, S. O. (2017). Green manufacturing and operational performance of a firm: Case of cement manufacturing in Kenya. *International Journal of Business and Social Science*, 8(4), 106-120.
- Faris, H. M., & Maan, H. Y. (2020, August). Evaluation of Green Supply Chain Management Practices Under Uncertainty Environment: Case Study in The Company for Batteries Industry. In *IOP Conference Series: Materials Science and Engineering* (Vol. 881, No. 1, p. 012085). IOP Publishing.
- Fawcett, S. E., Osterhaus, P., Magnan, G. M., Brau, J. C., & McCarter, M. W. (2007). Information sharing and supply chain performance: the role of connectivity and willingness. *Supply Chain Management: An International Journal*, 12(5), 358-368.
- Fore, S. and Mbohwa, C.T. (2015). Cleaner production for environmental conscious manufacturing in the foundry industry, *Journal of Engineering, Design and Technology*, Vol. 8 No. 3, pp. 314-333. <https://doi.org/10.1108/17260531011086180>
- Garson, G. D. (2012). *Testing statistical assumptions*. USA: Statistical Publishing Associates.
- Geng, R., Mansouri, S. A., & Aktas, E. (2017). The relationship between green supply chain management and performance: A meta-analysis of empirical evidences in Asian emerging economies. *International journal of production economics*, 183, 245-258.
- Gengeswari, K., Padmashantini, P., & Sharmeela-Banu, S. A. (2013). Impact of customer retention practices on firm performance. *International Journal of Academic Research in Business and Social Sciences*, 3(7), 68.
- Ghasemi, A., & Zahediasl, S. (2012). Normality tests for statistical analysis: a guide for nonstatisticians. *International Journal of Endocrinology and Metabolism*, 10(2), 486-489.
- Ghazilla, R. A. R., Sakundarini, N., Abdul-Rashid, S. H., Ayub, N. S., Olugu, E. U., & Musa, S. N. (2015). Drivers and barriers analysis for green manufacturing practices in Malaysian SMEs: a preliminary findings. *Procedia Cirp*, 26, 658-663.
- Glick, P., Larsen, S., Johnson, C., & Branstiter, H. (2005). Evaluations of sexy women in low-and high-status jobs. *Psychology of women quarterly*, 29(4), 389-395.
- Gliner, J. A., Morgan, G. A., & Leech, N. L. (2011). *Research methods in applied settings: An integrated approach to design and analysis*. Routledge.
- Goksoy, S. (2013). The Role Of The Educational Manager's In The Management Of Change. *International Journal of Academic Research*, 5(6).
- Gouldson, A., & Murphy, J. (2000). Environmental policy and industrial innovation: Integrating environment and economy through ecological modernisation. *Geoforum* 31: 33 – 44.

- Goyal, K., & Kumar, S. (2021). Financial literacy: A systematic review and bibliometric analysis. *International Journal of Consumer Studies*, 45(1), 80-105.
- Green, K. W., Zelbst, P. J., Meacham, J., & Bhadauria, V. S. (2012). Green supply chain management practices: impact on performance. *Supply Chain Management: An International Journal*.
- Grönman, K., Soukka, R., Järvi-Kääriäinen, T., Katajajuuri, J. M., Kuisma, M., Koivupuro, H. K., ... & Linnanen, L. (2013). Framework for sustainable food packaging design. *Packaging Technology and Science*, 26(4), 187-200.
- Gunasekaran, A., Patel, C., & McGaughey, R. E. (2004). A framework for supply chain performance measurement. *International journal of production economics*, 87(3), 333-347.
- Hair Jr, J. F. (1995). Marketing education in the 1990's: A chairperson's retrospective assessment and perspective. *Marketing Education Review*, 5(2), 1-6.
- Hair, J. F., Gabriel, M., & Patel, V. (2014). AMOS covariance-based structural equation modeling (CB-SEM): Guidelines on its application as a marketing research tool. *Brazilian Journal of Marketing*, 13(2).
- Hair, J. F., William C. B., Babin, B. J., & Anderson, R. E. (2010). *Multivariate Data Analysis*. Englewood Cliffs, NJ: Prentice Hall.
- Hammersley, M., & Traianou, A. (2012). *Ethics in qualitative research: Controversies and contexts*. Sage.
- Hart, S. L. (1997). Beyond greening: strategies for a sustainable world. *Harvard business review*, 75(1), 66-77.
- Hayes, A. F., & Matthes, J. (2009). Computational procedures for probing interactions in OLS and logistic regression: SPSS and SAS implementations. *Behaviour research methods*, 41(3), 924-936.
- Heale, R., & Twycross, A. (2015). Validity and reliability in quantitative studies. *Evidence-based nursing*, 18(3), 66-67.
- Heijermans, B., & Cozby, D. (2003, May). The commercial development of hub platforms and the value to e&p producers. In *Offshore Technology Conference* (pp. OTC-15108). OTC.
- Hertzog, M. A. (2008). Considerations in determining sample size for pilot studies. *Research in nursing & health*, 31(2), 180-191.
- Hill, A., & Brown, S. (2007). Strategic profiling: A visual representation of internal strategic fit in service organisations. *International Journal of Operations & Production Management*, 27(12), 1333-1361.
- Hill, R. (1998). *The mathematical theory of plasticity* (Vol. 11). Oxford university press.

- Hirsch, P. M. (1975). Organizational effectiveness and the institutional environment. *Administrative science quarterly*, 327-344.
- Hong-kit Yim, F., Anderson, R. E., & Swaminathan, S. (2004). Customer relationship management: Its dimensions and effect on customer outcomes. *Journal of Personal Selling & Sales Management*, 24(4), 263-278.
- Huang, W., Jiang, Z., Zhu, S., Yan, W., & Wang, Y. (2024). A comprehensive method for performance analysis of green supply chain management in steel enterprises integrating TAHP, LMBP and DEMATEL. *International Journal of Logistics Research and Applications*, 27(5), 580-603.
- Hurdley, R. (2010). In the picture or off the wall? Ethical regulation, research habitus, and unpeopled ethnography. *Qualitative Inquiry*, 16(6), 517-528.
- Jabbour, C. J. C. (2015). Environmental training and environmental management maturity of Brazilian companies with ISO14001: empirical evidence. *Journal of Cleaner Production*, 96, 331-338.
- Jänicke, M. (2008). Ecological modernisation: new perspectives. *Journal of cleaner production*, 16(5), 557-565.
- Jaworski, B. J., & Kohli, A. K. (1996). Market orientation: review, refinement, and roadmap. *Journal of Market-Focused Management*, 1, 119-135.
- Jayachandran, S., Sharma, S., Kaufman, P., & Raman, P. (2005). The role of relational information processes and technology use in customer relationship management. *Journal of marketing*, 69(4), 177-192.
- Jinkarn, T., & Suwannaporn, P. (2015). Trade-off analysis of packaging attributes for foods and drinks. *British Food Journal*, 117(1), 139-156.
- Johansson, T. B., & Lindhqvist, T. (2005). Management and policy for sustainable consumption and production. *Journal of Cleaner Production*, 13(10-11), 967-969.
- Julious, S. A. (2005). Sample size of 12 per group rule of thumb for a pilot study. *Pharmaceutical Statistics: The Journal of Applied Statistics in the Pharmaceutical Industry*, 4(4), 287-291.
- Khan, M., Serafeim, G., & Yoon, A. (2016). Corporate sustainability: First evidence on materiality. *The accounting review*, 91(6), 1697-1724.
- Khan, S. A. R., & Qianli, D. (2017). Impact of green supply chain management practices on firms' performance: an empirical study from the perspective of Pakistan. *Environmental Science and Pollution Research*, 24, 16829-16844.
- Khor, K. S., & Udin, Z. M. (2013). Reverse logistics in Malaysia: Investigating the effect of green product design and resource commitment. *Resources, Conservation and Recycling*, 81, 71-80.
- Kirchoff, J. F., Omar, A., & Fugate, B. S. (2016). A behavioral theory of sustainable supply chain management decision making in non-exemplar firms. *Journal of supply chain management*, 52(1), 41-65.

- Kirchoff, J. F., Omar, A., & Fugate, B. S. (2016). A behavioral theory of sustainable supply chain management decision making in non-exemplar firms. *Journal of supply chain management*, 52(1), 41-65.
- KNBS (2016). Economic survey. <https://www.knbs.or.ke/reports/2016-economic-survey/>
- Lee, H. L., Padmanabhan, V., & Whang, S. (1997). Information distortion in a supply chain: The bullwhip effect. *Management science*, 43(4), 546-558.
- Leech, N. L., & Onwuegbuzie, A. J. (2011). Beyond constant comparison qualitative data analysis: Using NVivo. *School psychology quarterly*, 26(1), 70.
- Li, S., & Lin, B. (2006). Accessing information sharing and information quality in supply chain management. *Decision support systems*, 42(3), 1641-1656.
- Liao, Y., Kwaramba, C. S., & Kros, J. F. (2020). Supply chain traceability: an institutional theory perspective. *International Journal of Logistics Economics and Globalisation*, 8(3), 193-223.
- Lindner, J. R., & Wingenbach, G. J. (2002). Communicating the handling of nonresponse error in Journal of Extension Research in Brief articles. *The Journal of Extension*, 40(6), 9.
- Lotfi, Z., Mukhtar, M., Sahran, S., & Zadeh, A. T. (2013). Information sharing in supply chain management. *Procedia Technology*, 11, 298-304.
- Macfarlane, B. (1997). *Business studies in higher education: towards a new understanding* (Doctoral dissertation, Institute of Education, University of London).
- MacFarlane, N. (1999). Transcaucasus and the Caspian region with particular focus on energy issues. *Economic Developments And Reforms In Cooperation Partner Countries: The Link Between Economics, Security And Stability*, 219.
- Mafini, C., & Loury-Okoumba, W. V. (2018). Extending green supply chain management activities to manufacturing small and medium enterprises in a developing economy. *South African Journal of Economic and Management Sciences*, 21(1), 1-12.
- Magazzino, C., Alola, A. A., & Schneider, N. (2021). The trilemma of innovation, logistics performance, and environmental quality in 25 topmost logistics countries: A quantile regression evidence. *Journal of Cleaner Production*, 322, 129050.
- Mani, V., Gunasekaran, A., Papadopoulos, T., Hazen, B., & Dubey, R. (2016). Supply chain social sustainability for developing nations: Evidence from India. *Resources, Conservation and Recycling*, 111, 42-52.
- Marinagi, C., Trivellas, P., & Reklitis, P. (2015). Information quality and supply chain performance: The mediating role of information sharing. *Procedia-Social and Behavioral Sciences*, 175, 473-479.445-458.

- Mbalwa, P.N., Kombo, H., Chepkoech, L.C., Koech, S. & Shavulimo, P.M. (2014). Effect of corporate governance on performance of sugar manufacturing firms in Kenya: A case of sugar manufacturing firms in Western Kenya. *IOSR Journal of Business and Management*, 16(11), 86-112.
- McGinnis, M. A., & Vallopra, R. M. (1999). Purchasing and supplier involvement: issues and insights regarding new product success. *Journal of Supply Chain Management*, 35(2), 4-15.
- Min, H., & Galle, W. P. (2001). Green purchasing practices of US firms. *International journal of operations & production management*, 21(9), 1222-1238.
- Moberg, C. R., Cutler, B. D., Gross, A., & Speh, T. W. (2002). Identifying antecedents of information exchange within supply chains. *International Journal of Physical Distribution & Logistics Management*, 32(9), 755-770.
- Mol, A. P. J., & Spaargaren, G. (1993). Environment, Modernity And The Risk-Society: The Apocalyptic Horizon Of Environmental Reform. *International Sociology*, 8(4), 431-459. <https://doi.org/10.1177/026858093008004003>
- Molina-Besch, K., & Pålsson, H. (2016). A supply chain perspective on green packaging development-theory versus practice. *Packaging Technology and Science*, 29(1), 45-63.
- Mugenda, O., & Mugenda, A. (2003). *Research Methods Quantitative and Qualitative Approaches*. Nairobi: ACTS Press
- Murphy, K. P. (2012). *Machine learning: a probabilistic perspective*. MIT press.
- Naing, L., Winn, T. B. N. R., & Rusli, B. N. (2006). Practical issues in calculating the sample size for prevalence studies. *Archives of orofacial Sciences*, 1, 9-14.
- Najmi, A., Maqbool, H., Ahmed, W., & Rehman, S. A. U. (2020). The influence of greening the suppliers on environmental and economic performance. *International Journal of Business Performance and Supply Chain Modelling*, 11(1), 69-90.
- Namjoo, M. R., & Keramati, A. (2018). Analysing Causal dependencies of composite service resilience in cloud manufacturing using resource-based theory and DEMATEL method. *International Journal of Computer Integrated Manufacturing*, 31(10), 942-960.
- Ninlawanet, C., Seksan, P., Tossapol, K. & Pilada, W. (2010). *The Implementation of Green Supply Chain*. Management Practices in Electronics Industry. Proceedings of the international Multi-conference of engineers and computer scientists, 21 (2), 1563-1568
- Odock, S. O. (2016). *Green supply chain management practices and performance of ISO 14001 certified manufacturing firms in East Africa* (Doctoral dissertation, University of Nairobi).
- Orji, I., & Wei, S. (2016). A detailed calculation model for costing of green manufacturing. *Industrial Management & Data Systems*.

- Orodho, J. A. (2009). Elements of education and social science research methods. *Nairobi/Maseno*, 2(6), 26-133.
- Ouyang, H. Z. (2014). Selection and application of green packaging materials. *Advanced Materials Research*, 886, 289-293.
- Panagopoulos, N. G., & Avlonitis, G. J. (2010). Performance implications of sales strategy: the moderating effects of leadership and environment. *International Journal of Research in Marketing*, 27(1), 46-57.
- Patino, C. M., & Ferreira, J. C. (2018). Internal and external validity: can you apply research study results to your patients? *Jornal brasileiro de pneumologia*, 44, 183-183.
- Pekkola, S., Saunila, M., Ukko, J., & Rantala, T. (2016). The role of performance measurement in developing industrial services. *Journal of quality in maintenance engineering*, 22(3), 264-276.
- Peteraf, M. A. (1993). The cornerstones of competitive advantage: a resource-based view. *Strategic management journal*, 14(3), 179-191.
- Peteraf, MA, & Barney, JB (2003). Unraveling the resource-based tangle. *Managerial and Decision Economics*, 24(4), 309–323. <https://doi.org/10.1002/mde.1126>
- Petersen, M. A., & Rajan, R. G. (1994). The benefits of lending relationships: Evidence from small business data. *The Journal of Finance*, 49(1), 3-37.
- Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: a critical review of the literature and recommended remedies. *Journal of applied psychology*, 88(5), 879.
- Polit, D. F., London, A. S., & Martinez, J. M. (2001). The Health of Poor Urban Women: Findings from the Project on Devolution and Urban Change. *Reports Research Journal* pg.115 <https://eric.ed.gov/?id=ED461760>
- Punniyyamoorthy, M., & Muruli, R. (2008). Balance score for the Balance Score card. *Benchmarking, an International Journal*, 15(4), 420-443.
- Rambeli, N., Hashim, A., Hashim, E., Jalil, N. A., & Gan, P. T. (2019). Does Energy Consumption Influence the CO2 Emission? *International Journal of Academic Research in Accounting, Finance and Management Sciences*, 9(3), 329-335.
- Razzaq, A., Ajaz, T., Li, J. C., Irfan, M., & Suksatan, W. (2021). Investigating the asymmetric linkages between infrastructure development, green innovation, and consumption-based material footprint: Novel empirical estimations from highly resource-consuming economies. *Resources Policy*, 74, 102302.
- Rezaei, S. D., Shannigrahi, S., & Ramakrishna, S. (2017). A review of conventional, advanced, and smart glazing technologies and materials for improving indoor environment. *Solar Energy Materials and Solar Cells*, 159, 26-51.
- Richard, P. J., Devinney, T. M., Yip, G. S., & Johnson, G. (2009). Measuring organizational performance: Towards methodological best practice. *Journal of management*, 35(3), 718-804.

- Royston, P. (1992). Approximating the Shapiro-Wilk W-test for non-normality. *Statistics and computing*, 2(3), 117-119.
- Sako, M. (2004). Supplier development at Honda, Nissan and Toyota: comparative case studies of organizational capability enhancement. *Industrial and corporate change*, 13(2), 281-308.
- Samar Ali, S., Kaur, R., Ersöz, F., Lotero, L., & Weber, G. W. (2019). Evaluation of the effectiveness of green practices in manufacturing sector using CHAID analysis. *Journal of Remanufacturing*, 9, 3-27.
- Sánchez-Rodríguez, C., Hemsworth, D., & Martínez-Lorente, Á. R. (2005). The effect of supplier development initiatives on purchasing performance: a structural model. *Supply chain management: an international journal*, 10(4), 289-301.
- Sekaran, U., & Bougie, R. (2010). *Research Methods for Business: A Skill Building Approach* (5th edition). New Jersey: John Wiley and Sons.
- Seman, N. A. A., Govindan, K., Mardani, A., Zakuan, N., Saman, M. Z. M., Hooker, R. E., & Ozkul, S. (2019). The mediating effect of green innovation on the relationship between green supply chain management and environmental performance. *Journal of cleaner production*, 229, 115-127.
- Seubert, E., Balaji, Y., & Makhija, M. (2001). The Knowledge Imperative, http://www.cio.com/sponsors/031501_km.html.
- Shan, H., Li, Y., & Shi, J. (2020). Influence of supply chain collaborative innovation on sustainable development of supply chain: a Study on Chinese Enterprises. *Sustainability*, 12(7), 2978.
- Shang, K. C., Lu, C. S., & Li, S. (2010). A taxonomy of green supply chain management capability among electronics-related manufacturing firms in Taiwan. *Journal of environmental management*, 91(5), 1218-1226.
- Shao, J., & Ünal, E. (2019). What do consumers value more in green purchasing? Assessing the sustainability practices from demand side of business. *Journal of Cleaner Production*, 209, 1473-1483.
- Shapiro, S. S., & Francia, R. S. (1972). An approximate analysis of variance test for normality. *Journal of the American statistical Association*, 67(337), 215-216.
- Sharfman, M. P., Shaft, T. M., & Anex Jr, R. P. (2009). The road to cooperative supply-chain environmental management: trust and uncertainty among pro-active firms. *Business Strategy and the Environment*, 18(1), 1-13.
- Sink, C. A., & Mvududu, N. H. (2010). Statistical power, sampling, and effect sizes: Three keys to research relevancy. *Counseling Outcome Research and Evaluation*, 1(2), 1-18.
- Song, J. H., Murphy, R. J., Narayan, R., & Davies, G. B. H. (2009). Biodegradable and compostable alternatives to conventional plastics. *Philosophical transactions of the royal society B: Biological sciences*, 364(1526), 2127-2139.

- Sonnenfeld, D. A., & Mol, A. P. J. (2002). Ecological Modernization, Governance, and Globalization: Epilogue. *American Behavioral Scientist*, 45(9), 1456-1461. <https://doi.org/10.1177/0002764202045009009>
- Strouhal, J., Gurviš, N., Nikitina-Kalamäe, M., & Startseva, E. (2015). Finding The Link Between CSR Reporting And Corporate Financial Performance: Evidence On Czech And Estonian Listed Companies. *Central European Business Review*, 4(3).
- Tolmie, C. R., Lehnert, K., & Zhao, H. (2020). Formal and informal institutional pressures on corporate social responsibility: A cross-country analysis. *Corporate Social Responsibility and Environmental Management*, 27(2), 786-802.
- Towill, D. R. (2005). The impact of business policy on bullwhip induced risk in supply chain management. *International Journal of Physical Distribution & Logistics Management*, 35(8), 555-575.
- Ünal, E., & Shao, J. (2019). A taxonomy of circular economy implementation strategies for manufacturing firms: Analysis of 391 cradle-to-cradle products. *Journal of Cleaner Production*, 212, 754-765.
- VanVoorhis, C. W., & Morgan, B. L. (2007). Understanding power and rules of thumb for determining sample sizes. *Tutorials in quantitative methods for psychology*, 3(2), 43-50.
- Verghese, K., & Lewis, H. (2007). Environmental innovation in industrial packaging: a supply chain approach. *International Journal of Production Research*, 45(18-19), 4381-4401.
- Vrchota, J., Pech, M., Rolinek, L., & Bednář, J. (2020). Sustainability outcomes of green processes in relation to industry 4.0 in manufacturing: Systematic review. *Sustainability*, 12(15), 5968.
- Wallen, N. E., & Fraenkel, J. R. (2013). *Educational research: A guide to the process*. Routledge.
- Weale, M. (1992). Estimation of data measured with error and subject to linear restrictions. *Journal of Applied Econometrics*, 7(2), 167-174.
- Wernerfelt, B. (1984). A resource-based view of the firm. *Strategic management journal*, 5(2), 171-180.
- Wernerfelt, B. (1994). On the function of sales assistance. *Marketing Science*, 13(1), 68-82.
- White, C. D., Masanet, E., Rosen, C. M., & Beckman, S. L. (2003). Product recovery with some byte: an overview of management challenges and environmental consequences in reverse manufacturing for the computer industry. *Journal of Cleaner Production*, 11(4),
- Williams, M. N., Grajales, C. A. G., & Kurkiewicz, D. (2013). Assumptions of multiple regression: Correcting two misconceptions. *Practical Assessment, Research, and Evaluation*, 18(1), 11.

- Xiao, Y., Yang, S., Zhang, L., & Kuo, Y. H. (2016). Supply chain cooperation with price-sensitive demand and environmental impacts. *Sustainability*, 8(8), 716.
- Yang, Y., Liu, Y., Lv, X., Ai, J., & Li, Y. (2022). Anthropomorphism and customers' willingness to use artificial intelligence service agents. *Journal of Hospitality Marketing & Management*, 31(1), 1-23.
- Yang, Y., Wang, L., Wang, Y., Bi, Z., Xu, Y., & Pan, S. (2014). Modeling and optimization of two-stage procurement in dual-channel supply chain. *Information Technology and Management*, 15, 109-118.
- Yildiz Çankaya, S., & Sezen, B. (2019). Effects of green supply chain management practices on sustainability performance. *Journal of Manufacturing Technology Management*, 30(1), 98-121.
- Yu, Z., Yan, H., & Edwin Cheng, T. C. (2001). Benefits of information sharing with supply chain partnerships. *Industrial management & Data systems*, 101(3), 114-121.
- Zailani, S. H. M., Eltayeb, T. K., Hsu, C. C., & Tan, K. C. (2012). The impact of external institutional drivers and internal strategy on environmental performance. *International journal of operations & production management*.
- Zailani, S., Govindan, K., Iranmanesh, M., Shaharudin, M. R., & Chong, Y. S. (2015). Green innovation adoption in automotive supply chain: the Malaysian case. *Journal of cleaner production*, 108, 1115-1122.
- Zhao, X., Xie, J., & Leung, J. (2002). The impact of forecasting model selection on the value of information sharing in a supply chain. *European Journal of Operational Research*, 142(2), 321-344.
- Zhou, Y., Xu, L., & Muhammad Shaikh, G. (2019). Evaluating and prioritizing the green supply chain management practices in Pakistan: Based on Delphi and fuzzy AHP approach. *Symmetry*, 11(11), 1346.
- Zhu, Q., & Sarkis, J. (2006). An inter-sectoral comparison of green supply chain management in China: drivers and practices. *Journal of cleaner production*, 14(5), 472-486.
- Zhu, Q., Sarkis, J., & Geng, Y. (2005). Green supply chain management in China: pressures, practices and performance. *International journal of operations & production management*, 25(5), 449-468.
- Zhu, Q., Sarkis, J., & Lai, K. H. (2012). Examining the effects of green supply chain management practices and their mediations on performance improvements. *International journal of production research*, 50(5), 1377-1394.
- Zikmund, W.G., Babin, B.J., Carr, J.C., Griffin, M. (2013), *Business Research Methods*. 9th ed. Mason: South-Western Cengage Learning
- Zikmund-Fisher, B.J. (2013). *Ability To Identify Out-Of-Range Test Results In Standard Tables Is Highly Dependent On Numeracy*. The 35th Annual Meeting of the Society for Medical Decision Making Conference. SMDM Publisher.

APPENDICES

Appendix I: Preamble Letter

Dear Sir/Madam

RE: REQUEST FOR PERMISSION TO UNDERTAKE RESEARCH

I am a postgraduate student at Moi University. I am conducting research entitled: **GREEN SUPPLY CHAIN MANAGEMENT PRACTICES, INFORMATION SHARING AND PERFORMANCE OF MANUFACTURING FIRMS IN NAIROBI COUNTY, KENYA**, as University's part of obligation to accomplish my studies in line of master's in Logistics and Supplies (Master in Logistics and Supplies option) degree.

I kind heartedly plea for your collaboration in providing the requisite information by responding to all research questions in the questionnaire research analysis anchored hereto. Your contribution and support with regard to the accomplishment of this crucial practice will be highly regarded. Information presentation will be treated with confidentiality.

Thanks for your support.

Yours sincerely,

EDWIN K. TARUS

MLS/4414/2

Appendix II: Questionnaire

Responding to the questionnaire is a valuable contribution to our task. This questionnaire has been designed to collect information on the effects of green supply chain management practices on firm performance of manufacturing firms in Kenya, please read carefully and answer them as honestly as possible. You are kindly requested to respond to the questionnaire items provided to the best of your knowledge. Please note there is no right or wrong answers. The information gathered will be used purely for the purpose of academic research and will be treated with the uttermost confidence possible.

SECTION A: BACKGROUND INFORMATION

1. What is the total population of employees in your corporation?

Below 100 () 101-300 ()

301-500 () Above 500 ()

2. How long has the firm been in operation?

Between 10 years () between 11-30 years ()

Between 31-50 years () between 51-70 years ()

Above 70 years ()

SECTION B: EXTENT TO WHICH GREEN SUPPLY CHAIN MANAGEMENT PRACTICES HAVE BEEN IMPLEMENTED IN YOUR COMPANY

4. Please indicate the extent to which you agree with the following statements on the extent to which your organization has been practicing the following green supply chain practices. The scale below will be applicable:

1= Strongly Disagree 2= Disagree 3= Undecided 4= Agree 5= Strongly Agree

GREEN SUPPLY CHAIN MANAGEMENT PRACTICES						
GREEN MANUFACTURING						
GM1	The firm collaborate with supplies in designing products which are environmental friendly	5	4	3	2	1
GM2	The firm use recycled material in their manufacturing process	5	4	3	2	1
GM3	The firm uses green energy in its manufacturing process	5	4	3	2	1
GM4	The firm has effective mechanisms that control emission of harmful gases to the environment during process of productions	5	4	3	2	1
GM5	The firm recycles internal waste generated during manufacturing process	5	4	3	2	1
GM6	Reduction in pollution by contracting firms that observe environmentally friendly principles or EMS certified	5	4	3	2	1
GM7	The firm contract firms who adhere to environmental rules and are EMS certified during manufacturing process	5	4	3	2	1
GM8	The firm practices Safe disposal of non-recyclable waste (especially hazardous waste)	5	4	3	2	1
GREEN PACKAGING						
GP1	The firm use environmental friendly material for packaging	5	4	3	2	1
GP2	The firm collaborate with its distributors/vendors in adhering to environmental friendly rules when packaging	5	4	3	2	1
GP3	The use environmental friendly warehouse for storing it packaged products	5	4	3	2	1
GP4	The firm labels their packaged product with a notice on customer on how to handle, use and dispose the products	5	4	3	2	1

GP5	The company has adopted Eco-labeling to describe the information of a product about the environmental impact	5	4	3	2	1
GP6	The firm use recycle material for packaging to reduce disposal of packaging material by using materials with recyclable contents	5	4	3	2	1
GREEN PURCHASING						
GPR1	The firm purchase products/raw materials from supplier who adhere to environmental standards and are EMS certified	5	4	3	2	1
GPR2	The firm select supplier who have the capacity to develop materials which are environmentally friendly	5	4	3	2	1
GPR3	The firm purchases material that can be recycled	5	4	3	2	1
GPR4	The firm purchases products that are packaged with bio degradable materials	5	4	3	2	1
GPR5	The firm use materials which are less toxic and hazardous through it purchasing process such as electronic received, order and payment	5	4	3	2	1

SECTION C: INFORMATION SHAIRING.

IS1	The firm regularly shares accurate and integrated information with our suppliers	5	4	3	2	1
IS2	The firm promptly sends any document upon supplier request	5	4	3	2	1
IS3	Our supplier easily share information with us upon request	5	4	3	2	1
IS4	The firms' gives immediate feedback to supplier on products delivered	5	4	3	2	1
IS5	The firm ensure their regular and effective communication with its suppliers	5	4	3	2	1
IS6	The firm conducts periodic meetings with suppliers to address their views and or problems	5	4	3	2	1
IS7	The firm ensures that both parties are regularly informed about events or changes that may affect the other party	5	4	3	2	1

SECTION D: FIRM PERFORMANCE

Below is a statement that your business might have achieved since you started it. Please rate the following statements according to the best of your knowledge.

KEY: Strongly Disagree 2= Disagree 3= Undecided 4= Agree 5= Strongly Agree

	FIRM PERFORMANCE					
FP1	Total sales have grown faster than that of our main competitors	1	2	3	4	5
FP2	There is a higher level of customer loyalty with our customers	1	2	3	4	5
FP3	We have achieved new product development than our main competitors	1	2	3	4	5
FP4	Market share has increased faster than that of our main competitors	1	2	3	4	5
FP5	We have achieved better customer satisfaction on product quality compared with those of our competitors	1	2	3	4	5

Appendix III: University Recommendation Letter



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RE: MU/SBE/PGR/ACD/21B

DATE: 22nd November, 2022

TO WHOM IT MAY CONCERN:

RE: EDWIN TARUS - MLS/4414/20

The above named is a bonafide student of Moi University, School of Business & Economics. He is undertaking **Masters in Logistics Systems and Supplies Management**.

Mr. Tarus has successfully completed coursework, defended his proposal, and is proceeding to the field to collect data for his research titled: *"Green Supply Chain Management Practices, Information Sharing and Performance of Manufacturing Firms in Nairobi County, Kenya"*.

Any assistance accorded to him will be highly appreciated.

Yours faithfully,

 **SCHOOL OF BUSINESS &
ECONOMICS
MOI UNIVERSITY
3900 ELDORET-30100**

**DR. RONALD BONUKE
ASSOCIATE DEAN AND CHAIR-POSTGRADUATE STUDIES**

/pn



(ISO 9001:2015 Certified Institution)

Appendix IV: List of Manufacturing Firms in Nairobi County, Kenya

1. (EA) Ltd
2. AAM Resources
3. Access Alliance Ltd
4. ACME Containers Ltd
5. Aquila Development Co. Ltd
6. Adpak International Ltd
7. Africa Apparels Ltd
8. Africa Spirits Ltd
9. African Cotton Industries Ltd
10. African Retail Trader Ltd
11. Africote Ltd
12. Afro Plastics (K) Ltd
13. Agri Pro Pak Ltd
14. Agriner Agricultural Development Ltd
15. Agro Irrigation & Pump Ltd
16. Ajit Clothing factory Ltd
17. Alamdar Trading Company Ltd
18. Alliance One Tobacco Kenya Ltd
19. Allied East Africa Ltd
20. Alloy Steel Castings Ltd
21. Allpack Industries Ltd
22. Alltex EPZ Ltd
23. Al-Mahra industries Ltd
24. Almasi Beverages Limited
25. Alpha Fine Foods Ltd
26. Alpha Gram Milers Ltd
27. Alpha Knits Ltd
28. Alpha Medical Manufacturers Ltd
29. Alpine Coolers Ltd
30. Amedo Centre Kenya Ltd
31. Anffi Kenya Ltd
32. Apex steel Ltd
33. Appex Apparels (EPZ) Ltd
34. Aquamist Ltd
35. Arvind Engineering Ltd
36. Asano International Ltd
37. Ascent Capital Advisory Services Ltd
38. Ashut Engineers Ltd
39. ASKADOC Ltd
40. ASL Ltd
41. ASP Company Ltd
42. Assa Abloy East Africa Ltd
43. Associated Battery Manufacturers. (EA) Ltd
44. Associated Paper & Stationery Ltd
45. Athi River Mining Ltd
46. Athi River Steel Plant Ltd
47. Aucma Digital Technology Africa Ltd
48. Auto Ancillaries Ltd
49. Auto Industries Ltd
50. Auto Springs Manufacturers Ltd
51. Autolitho Ltd
52. Autosterile (EA)
53. Avery (East Africa) Ltd
54. Avery Dennison Ltd
55. Aviano East Africa Ltd
56. Bag and Envelope Converters Ltd
57. Bakers Corner Ltd
58. Bakex Millers Ltd
59. Bamburi Cement Ltd
60. Bamburi Special Products Ltd
61. Banbros Ltd
62. Basco Products (K) Ltd
63. Bast East Africa Ltd
64. Baumann Engineering Ltd
65. Bayer East Africa Ltd
66. Beberavi Collections Ltd
67. Beiersdorf East Africa Ltd
68. Belfast Millers Ltd
69. Beta Healthcare International Ltd
70. Betatrad (K) Ltd
71. Beverage Services (K) Ltd
72. Bhachu Industries Ltd
73. Bio Food Products Ltd
74. Biodeal Laboratories Ltd
75. Biopharma Ltd
76. Blue Key Software Solutions (K) Ltd
77. Blue Nile Wire Products Ltd
78. Blue Ring Products Ltd
79. BMG Holdings Ltd
80. Bobmil Industries Ltd
81. BOC Kenya Ltd
82. Boyama Building Materials Ltd
83. Brand ID Technologies (EA) Ltd
84. Brand Printers Ltd
85. Breakfast Cereal Company (K) Ltd
86. British American Tobacco Kenya Ltd
87. Broadband Communication Network Limited
88. Broadway Bakery Ltd
89. Brush Manufacturers Ltd
90. Budget Furniture Ltd
91. Budget Shoes Ltd
92. Bureau Veritas Kenya Ltd
93. Buyline Industries Ltd
94. C & P Shoes Industries Ltd
95. C. Czarnikow Sugar (EA) Ltd
96. C. Dormans Ltd

97. Cadbury Kenya Ltd
98. Canaaneast Company Ltd -
99. Candy Kenya Ltd
100. Canon Chemicals Ltd (former
United Chemicals Ltd)
101. Capel Food Ingredients Ltd
102. Capital Colors Creative
Designers Ltd
103. Carbacid (CO2) Ltd
104. Carton Manufacturers Ltd
105. Central Glass Industries Ltd
106. Ceven Limited
107. CFL Advocates Ltd
108. Chain Solutions Ltd
109. Chalange Industries Ltd
110. Chandaria Industries Ltd
111. Chemicals and Solvents
112. Chirag Kenya Ltd
113. Choda Fabricators Ltd
114. Chrysal Africa Ltd
115. Chryso East African limited
116. Chui Auto Spring Industries Ltd
117. Cica Motors Ltd
118. Citigroup Kenya Ltd
119. City Engineering Works Ltd
120. Cityscape Trends Services Ltd
121. CMC Motors Group Ltd
122. Colour Labels Ltd
123. Colour Packaging Ltd
124. Colourprint Ltd
125. Complast Industries Ltd
126. Compulynx Ltd
127. Coninx Industries Ltd
128. Consumer Options Ltd
129. Control Risk East Africa
130. Cooper K- Brands Ltd
131. Copy-Cat Ltd
132. Corn Products Kenya Ltd
133. Corporate Facilities Ltd
134. Cosmos Ltd
135. Crop Nutrition Laboratory
Services Ltd
136. Crown Beverages Ltd
137. Crown Paints (Kenya) Ltd
138. Crystal Industries Ltd
139. Danish Cleantech Group Ltd
140. Danone Baby Nutrition Africa
and Overseas Ltd
141. Davis & Shirtliff Ltd
142. Dawa Ltd
143. De La Rue Currency and
144. Decase Chemicals (Ltd)
145. Deepa Industries Ltd
146. Del Monte Kenya Ltd
147. Delegation of German Industries
Ltd
148. Deloitte Er Touche Ltd
149. Deluxe Inks Ltd
150. Desbro Kenya Ltd
151. Devski Steel Mills Ltd
152. Dharamshi & Co. (Ltd)
153. Digital Hub Limited
154. Digitech East Africa Ltd
155. Dodhia Packaging Ltd
156. Dogbones Ltd
157. Dune Packaging Ltd
158. Dynapias Ltd
159. E & A Industries Ltd
160. East Africa Packaging
161. East Africa Portland Cement Co.
Ltd
162. East Africa Spectre Ltd
163. East African Breweries Ltd
164. East African Cables Ltd
165. East African Development
166. East African Foundry Works (K)
Ltd
167. East African Glassware
168. East African Sea Food Ltd
169. East African Seed Co. Ltd
170. Eastern Produce Kenya Ltd
(Kakuzi)
171. Easy Clean Africa Ltd
172. Economic Industries Ltd
173. Edible Oil Products Ltd
174. EHS Management Consultants
Ltd
175. Electrical Systems Ltd
176. Elex Products Ltd
177. Elgitreat (Kenya) Limited
178. Elgon Kenya Ltd
179. Elite Offset Ltd
180. Elite Tools Ltd
181. Ellams Products Ltd
182. Elys Chemical Industries Ltd
183. Embalishments Ltd
184. E-Momentum Interactive
185. English Press Ltd
186. Ennsvalley Bakery Ltd
187. Enviro-Hub Holdings Ltd
188. EPZ Ltd
189. Erdemann Co. (K) Ltd
190. Ernst & Young Ltd
191. Eslon Plastics of Kenya Ltd
192. Essential Manufacturing Ltd
193. Ethical Fashion Artisons
194. Europack packing Industries Ltd
195. European Perfumes & Cosmetics
Co. Ltd

196. Evan Enterprise Ltd
197. Eveready East Africa Limited
198. Excel Chemicals Ltd
199. Express Kenya Ltd
200. Farm Refrigeration &
201. Farmers Choice Ltd
202. Fine Engineering Ltd
203. Fine Wood Works Ltd
204. Finlay Brushware Ltd
205. Five Star Industries Ltd
206. Flair Kenya Ltd
207. Flamingo Tiles (Kenya) Limited
208. Forces Equipment (Kenya) Ltd
209. Foton East Africa Ltd
210. Franciscan Koibe Press Ltd
211. Fresh Produce Exporters
212. Friendship Container
Manufacturers Ltd
213. Frigoken Ltd
214. Eden Furniture International Ltd
215. Galaxy Paints & Coating Co. Ltd
216. GE East Afrika Services Ltd
217. General Aluminium Fabricators
Ltd
218. General Mills East Africa
Limited
219. General Motors East Africa Ltd
220. General Plastics Ltd
221. General Printers Ltd
222. Gesto Pharmaceuticals Ltd
223. Giloli Company Ltd
224. Glaciers Products (Amor Mia,
Dairy land, Mio) Ltd
225. Glaxo Smithkline Kenya Ltd
226. GlaxoSmithKline Kenya Ltd
227. Glenn Investments Ltd C/O The
Metta Group Ltd
228. Global Beverages Ltd
229. Global Fresh Ltd
230. Gonas Best Ltd
231. Gone Fishing Ltd
232. Gopitech (Kenya) Ltd
233. Grain Industries Ltd
234. Grand Paints Ltd
235. Green Forest Foods Ltd
236. GSI Kenya Limited
237. Guaca Stationers Ltd
238. H.B Fuller Limited
239. Haco Tiger Brands East Africa
Ltd
240. Halliday Finch Ltd
241. Harveer Bas Body Builders Ltd
242. Heavy Engineering Ltd
243. Henkel Polymer Limited
244. Henken Kenya Ltd
245. Highchem East Africa Ltd
246. Highlands Cannery Ltd
247. Hi-Plast Ltd
248. Hi-Tech Inks and Coatings Ltd
249. Holman Brothers (E.A) Ltd
250. Honda Motorcycle Limited
251. Honey Care Africa Ltd
252. Imani Flowers Limited
253. Industrial & Commercial
Development Corporation Ltd
254. Industrial & Scientific Support
Services Limited
255. Industrial Promotion Services
Limited
256. Industries Ltd
257. Insight Kenya Limited
258. Insight Management Consultants
Ltd
259. Insteel Ltd
260. Institute of Packaging
Professionals Limited
261. Interconsumer Products Ltd
262. International Energy Technik Ltd
263. International Green Pastures Ltd
264. International Paper & Board
Supplies Ltd
265. Intersoft Ltd
266. Intertek International Ltd
267. Intraspeed Arcpro Ltd
268. Iron Art Ltd
269. Jambo Biscuits (K) Ltd
270. Jamlam Industries Ltd
271. Johnson Diversey East & Central
Africa Ltd
272. Jomo Kenyatta Foundation
Limited
273. Josper Occupational Health &
Safety Ltd
274. Jumbo Quality Products Ltd
275. Kaizen Institute of Africa
Limited
276. Kaluworks Ltd
277. KAM Industries Ltd
278. Kamba manufacturing (1986) Ltd
279. Kamili Packers Ltd
280. Kankam Exporters Ltd
281. Kanku Kenya Limited
282. Kapa Oil Refineries Ltd
283. Karirana Estate Ltd
284. Karsan Murji & Company Ltd
285. Kartasi Industries Ltd
286. Kedsta Investment Limited
287. Kema E.A Ltd
288. Kemia International Ltd
289. Ken Nat Ink & Chemicals Ltd

290. Kenafric Diaries Manufacturers Ltd
291. Kenafric Industries Ltd
292. Kenblest Ltd
293. Kenbro industries Ltd
294. Kenbro Industries Ltd
295. Kenchic Ltd
296. Kenindia Assurance Company Ltd
297. Kenpoly Manufacturers Ltd
298. Kens Metal industries Ltd
299. Kentainers Ltd
300. Kenwest Cables Ltd
301. Kenya Breweries Ltd
302. Kenya Builiders & Concrete Ltd
303. Kenya Coach Industries Ltd
304. Kenya Fire Appliances Company Ltd
305. Kenya Flower Council Ltd
306. Kenya Grange Vehicle Industries Ltd
307. Kenya Horticultural Exporters (1977) Ltd
308. Kenya Litho Ltd
309. Kenya National Cleaner
310. Kenya Nut Company Ltd
311. Kenya Power & Lighting Co. Ltd
312. Kenya Shell Ltd
313. Kenya Stationers Ltd
314. Kenya Sweets Ltd
315. Kenya Tea Development Agency Limited
316. Kenya Trading (EPZ) Ltd
317. Kenya Vehicle Manufacturers Ltd
318. Kenya Wine Agencies Ltd
319. Kenya Wood Ltd
320. Kevian Kenya Ltd
321. Khetshi Dharamshi & Co Ltd
322. Kibo Africa Ltd
323. Kikoy Co. Ltd
324. Kim-Fay East Africa Ltd
325. King Finn Kenya Limited
326. King Plastic Industries Ltd
327. Kingsways Tyres & Automart Ltd
328. Kinpash Enterprises Ltd
329. Kip Melamine Co. Ltd
330. Kirinyaga Flour Millers Ltd
331. Knights & Apps Limited J
332. Koba Waters Ltd
333. Koto Housing Kenya Ltd
334. Kridha Limited
335. Kuguru Food Complex Ltd
336. Kul Graphics Ltd
337. Kwale International Company Ltd
338. Kwality Candies & Sweets Ltd
339. Label Converters Limited
340. Labh Singh Harram Sngh Ltd
341. Laboratory & Allied Ltd
342. Laneeb Plastic Industries Ltd
343. Lari Dairies Alliance Ltd
344. Le- Stud Ltd
345. Lean Energy Solutions Ltd
346. Leather Industries of Kenya Ltd
347. LG Harris & Co Ltd
348. Libya Oil Kenya Ltd (Formerly Mobil Oil Kenya)
349. London Distillers (K) Ltd
350. L'Oreal East Africa Ltd
351. Lubricants
352. Lynxbits Global Limited
353. Mabati Rolling Mills Ltd
354. Machinery and equipment consultants Limited
355. Magadi Soda Company Ltd
356. Magnate Ventures Ltd
357. Mahee Flowers Limited
358. Malplast Industries Ltd
359. Manchester Outfitters Ltd
360. Manipal International Printing Press Ltd
361. Manji Food Industries Ltd
362. Mann Manufacturing Co Ltd
363. Manufacturers & Suppliers (K) Ltd
364. Manufacturing Kenya Ltd
365. Maroo Polymers Ltd
366. Marshall Fowler (Engineers) Ltd
367. Mart Ltd (EAML)
368. Marubeni Corporation International Nairobi Office Limited
369. Marvel Lifestyle Ltd
370. Master Fabricators Ltd
371. Mastermind Tobacco (K) Ltd
372. Match Masters Ltd
373. Matengo Githae & Associates Limited
374. Mawport Training and Inspection Kenya Limited
375. Mecol Ltd
376. Megh Cushion Industries Ltd
377. Meghraj Capital Limited
378. Melvin Marsh international
379. Metal Crowns Ltd
380. Metlex International Ltd
381. Metoxide Africa Ltd
382. Metro Plastics Kenya Ltd

383. Metsec Cables Ltd
384. MFI Ultra Print Ltd
385. Midco Textiles (EA) Ltd
386. Millenium Management Consultants Ltd
387. Mills Industries Limited
388. Mini Bakeries (Nbi) Ltd
389. Mirage Fashionwear EPZ Ltd
390. Miritini Kenya Ltd
391. Modern Lithographic (K) Ltd
392. Modulec Engineering systems Ltd
393. Monwalk investments Ltd
394. Multi Packaging Ltd
395. Multivac North Africa Kenya Ltd
396. Muriu Mungai & Company Ltd
397. Murphy Chemicals Ltd
398. Mustek East Africa Ltd
399. Muthaura Mugambi & Njonjo Advocates Ltd
400. NailsJef Steel Products Ltd
401. Nairobi Bottlers Ltd
402. Nairobi Flour Mills Ltd
403. Nairobi Plastics Ltd
404. Napro Industries Ltd
405. NAS Airport Services Ltd
406. Nation Media Group Ltd
407. Nationwide Electrical Industries Ltd
408. Ndalex Digital Technology Ltd
409. Negawatt Limited
410. Nestle Foods Kenya Ltd
411. New Kenya Co-Operative Creameries Ltd
412. Newline Ltd
413. Ngecha Industries Ltd
414. Nicola Farms Ltd
415. Nokia Siemens Kenya Ltd
416. Norda Industries Ltd
417. Novastar Ventures Ltd
418. Odex Chemicals Ltd
419. Oilzone (E.A) Ltd C
420. Optimum Lubricants Ltd
421. Orbit Chemical Industries Ltd
422. Orbit Engineering Ltd c
423. Orbit Enterprises Ltd
424. Oriental Mills Ltd
425. Origicheck Company Limited
426. Osho Chemicals Industries Ltd
427. Oss.chemie (K Limited A)
428. Packaging Industries Ltd
429. Packaging Masters Limited
430. Palmy Enterprises limited
431. Panah Limited
432. Panesar's Kenya Ltd
433. Paper bags Limited
434. Paper House of Kenya Ltd
435. Passion Profit Limited
436. Patco Industries Ltd C
437. Patnet Steel Makers Manufacturers Ltd
438. Patronics Services Limited
439. PCTL Automation Ltd
440. Pearl Industries Ltd
441. Pembe Flour Mills Ltd A
442. Penny Galore Ltd s)
443. Pentagon Agencies Ltd
444. Pernod Ricard Kenya Ltd
445. PG Bison Ltd
446. Pharm Access Africa Ltd
447. Pharmaceutical Manufacturing Co. (K) Ltd
448. Philips EA Ltd
449. Pipe Manufacturers Ltd
450. PKF Consulting
451. Plastic Electrics Ltd
452. Plastics if Rubber Industries Ltd
453. Platinum Distillers Limited
454. Polyblend Ltd
455. PolyChem East Africa Ltd
456. Polyflex industries Ltd
457. Polythene Industries Ltd
458. Powerex Lubricants Ltd
459. Premier Flour Mills Ltd
460. Premier Food Industries Ltd
461. Premier Industries Ltd
462. Pressmaster Ltd
463. Printing Services Ltd
464. Printpak Multi Packaging Ltd
465. Printwell Industries Ltd
466. Pristine international Ltd
467. Procter if Gamble East Africa Ltd
468. Proctor if Allan (EA) Ltd
469. Production Centre Limited
470. Promasidor (Kenya) Ltd
471. Propack Kenya Limited
472. Prosel Ltd
473. Protea Chemicals Kenya Ltd
474. Protel Studios Ltd
475. Punchlines Ltd
476. PZ Cussons EA Ltd
477. Qplast Industries Ltd
478. Questa Care Ltd
479. R.T (East Africa) Ltd
480. Rafiki Millers Ltd
481. Raiser Resource Ltd
482. Ramco Printing Works Ltd
483. Razco ltd
484. Reckitt Benckiser (E A) Ltd
485. Regal Pharmaceuticals Ltd

486. Regal Press Kenya Ltd
487. Reliable Concrete Works Ltd
488. Reliable Electricals Engineers (Nrb) Ltd
489. Rentco East Africa Limited
490. Repelectric (K) Ltd
491. Re-Suns Spices Ltd
492. Revolution Stores Ltd
493. Rodi & Partner Ltd
494. Rodwell Press Ltd
495. Rok Industries Ltd
496. Rosewood Furniture Manufacturers Ltd
497. Rubber Products Ltd
498. Ruidu (Kenya) Company Limited
499. Rumorth EA Ltd.
500. Rutuba Bio Agri & Organic Fertilizers Co Ltd
501. Sadotin Paints (E.A) Ltd
502. SafalMitek Ltd
503. Safechem (K) Ltd
504. Safepak Ltd
505. Saj Ceramics Ltd
506. Salim Wazarani Kenya Company Ltd
507. Samco Holdings Ltd
508. Sameer Africa Ltd
509. Sameer Agriculture & Livestock (Kenya) Ltd
510. Sandstorm Africa Ltd
511. Sanergy Limited
512. Sanpac Africa Ltd
513. SBC Kenya Ltd
514. SC Johnson and Son Kenya Limited
515. Scales & Software (K) Ltd
516. Scania East Africa Limited
517. Security Print Ltd
518. Semco Business Park Limited
519. Service Shoes Africa Ltd
520. Sevenses Technology Ltd
521. Seweco Paints Ltd
522. SGS Kenya Limited
523. Shah Timber Mart Ltd
524. Shamco Industries Ltd
525. Sheffield Steel Systems Ltd
526. Shneider Limited
527. Sierra Cables East Africa Ltd
528. Sigma Supplies Ltd
529. Signode Packaging Systems Ltd
530. Silafica Kenya Ltd
531. Silafica Kenya Ltd
532. Silpack Industries Ltd
533. Singh Retread Ltd
534. Siya industries (K) Ltd
535. Skanen Interiabels Nairobi Ltd
536. Sketchers Design Promoters Ltd
537. Skylight Chemicals Ltd
538. Skyline Holdings Limited
539. Socabelec (EA) Ltd
540. Sohansons Ltd
541. SoiexProsoive Ltd
542. Solimpexs Africa Ltd
543. Soloh Worldwide Enterprises Ltd
544. Solvochem East Africa Ltd
545. Songyl Motorcycles International Ltd
546. Soroya Motors Spares
547. Space & Style Ltd
548. Specialized Engineering Co. (EA) Ltd
549. Specialized Power Systems Ltd
550. Spectrum Network Ltd
551. Spersjet East Africa Ltd A
552. Spice World Ltd
553. Springbox Kenya Ltd
554. Sproxil East Africa
555. St Theresa Industries Ltd
556. Standard Group Ltd
557. Stanlib Kenya Ltd
558. Statpack Industries Ltd
559. Stawi Foods and Fruits Limited
560. Steel structures Ltd
561. Steelmakers Ltd
562. Steelwool (Africa) Ltd
563. Straightline Enterprises Ltd
564. Strategic Industries Ltd
565. Strategic Value Ltd
566. Stratostaff EA Ltd
567. Styloplast Ltd
568. Summit Energy Systems Ltd
569. Sunam Shakti Ltd
570. Sunflag Textile & Knitwear Mills Ltd
571. Sunland Roses Ltd
572. Supa Snacks Ltd
573. SupaBrite Ltd
574. Super Manufacturers Ltd
575. Superfit Steelcon Ltd
576. Symbiotic Media Consortium Limited
577. Synergy Lubricants Solutions Limited
578. Synergy Pro Limited
579. Syngenta East Africa Ltd
580. Synresins Ltd
581. Systems Ltd
582. Taita Estate Ltd
583. Tarpo Industries Ltd
584. Tata Chemicals Magadi Ltd

585. Taws Ltd
586. Techno Brain Ltd
587. Techno Plast Ltd
588. Technoconstruct Kenya Ltd
589. Technosteel Industries Ltd
590. Techpak Industries Ltd
591. Tetra Pak Ltd
592. The Helios Limited
593. The Print Exchange
594. Thermopak Ltd
595. Tile & Carpet Centre Ltd
596. TimSales Ltd
597. Tissue Kenya Limited
598. Tononoka Rolling Mills Ltd
599. Tononoka Steel Ltd
600. Towertech Africa Ltd
601. Toyota Kenya Ltd
602. Toyota Tshusho East Africa Ltd
603. Tracesoft Ltd
604. Treadsetters Tyres Ltd
605. Tri-Clover Industries (K) Ltd
606. Tropical Brand (Afrika) Ltd
607. Trufoods Ltd
608. TSS Spinning and Weaving Ltd
609. Twiga Chemical Industries Ltd
610. Umati Capital (Kenya) Limited
611. Unga Group Ltd
612. UnifUters Kenya Ltd
613. Unilever East Africa Ltd
614. Uni-plastics
615. United Aryan (EPZ) Ltd
616. United Bags Manufacturers Ltd
617. United Distillers and Vintners
(UDV)
618. Universal Corporation Ltd
619. Unumed Ltd
620. Usafi Services Ltd
621. Uzuri foods Ltd
622. Vaja's Marnufacturers Ltd
623. Valuepak foods
624. Varoma Tech Limited
625. VarsaniBrakelinings Ltd
626. VavaCoffee Ltd
627. Vehicle and Equipment Leasing
Ltd
628. Vetcare Kenya Limited
629. Victoria Juice Company Ltd
630. Viking Industries Ltd
631. Virji Vishram Patel Er sons Ltd
632. Virtual City Ltd
633. Viscar Industrial Capacity Ltd
634. Vitafoam Products Ltd
635. Vivo Energy Kenya Ltd
636. W.E.Tiley (Muthaiga) Ltd
637. Wanji Food Industries Ltd
638. Waridi Creations Ltd
639. Warren Enterprises Ltd
640. Warriors Insight Limited
641. Welding Alloys Ltd
642. Westminister Paints and Resins
Ltd
643. Winnie's Pure Health
644. Wire Products Ltd
645. Wonderpac industries Ltd
646. Wood Makers (K) Ud
647. Woodtex Kenya J td
648. Wotech Kenya Ltd
649. Wrigley Company (E.A.) Ltd
650. Yoohan Kenya EPZ Ltd

Appendix V: Research Licence - NACOSTI

 REPUBLIC OF KENYA National Commission for Science, Technology and Innovation Ref No: 870294 RESEARCH LICENSE  License No: NACOSTI/P/23/28840 Applicant Identification Number 870294 NOTE: This is a computer-generated License. To verify the authenticity of this document, Scan the QR Code using QR scanner application. See overleaf for condition	NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION Date of Issue: 24/November/2022 GREEN SUPPLY CHAIN MANAGEMENT PRACTICES, INFORMATION SHARING AND PERFORMANCE OF MANUFACTURING FIRMS IN NAIROBI COUNTY, KENYA for the period ending : 24/August/2023. Director General NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION Verification QR Code 
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Appendix VI: Plagiarism Awareness Certificate



SR362

ISO 9001:2009 Certified Institution

THESIS WRITING COURSE

PLAGIARISM AWARENESS CERTIFICATE

This certificate is awarded to

EDWIN K. TARUS

MLS/4414/20

In recognition for passing the University's plagiarism

Awareness test for Thesis entitled GREEN SUPPLY CHAIN MANAGEMENT PRACTICES, INFORMATION SHARING AND PERFORMANCE OF MANUFACTURING FIRMS IN NAIROBI COUNTY, KENYA with a similarity index of 12% and striving to maintain academic integrity.

Word count: 24049

Awarded by

Prof. Anne Syomwene Kisilu

CERM-ESA Project Leader Date: 2/11/2023