Factors Affecting Sustainable Supply Chain Management In Kenyan Processing Factory

(A Case Study Of Iriaini Tea Factory, Nyeri South Sub-County)

John Kirima Mwenda

A Thesis Submitted to the School of Business Management and Economics in Partial Fulfillment for the Award of the Degree of Master of Science in Supply Chain Management at Dedan Kimathi University of Technology

FEBRUARY, 2019

DECLARATION

I declare that this is my original work and has not been presented in any other university or any institution of higher learning for examination/academic purposes.

Signature: _____ _____

JOHN KIRIMA MWENDA **Date**

B212-01-1595/2015

This research thesis has been submitted for defense with my approval as the university supervisors.

Signature: _____ _____

Dr. Kiarie. PhD. **Date**

Senior Lecturer,

Department of Procurement & Logistics

DeKUT

Signature: _____ _____

Dr. Pamela Marendi. PhD. **Date**

Lecturer,

Department of Procurement & Logistics

DeKUT

DEDICATION

I dedicate this thesis to my family, for their moral support and their unending endurance of my absence during my study period.

ACKNOWLEDGEMENT

I would like to thank God for his care, protection and provision throughout my studies and for giving me the strength and endurance to undertake this research thesis. I am grateful to my supervisors Dr. Pamela and Dr. Kiarie who has professionally and skillfully guided me through this thesis. My sincere thanks go in advance to entire the staff of the Iriani tea factory that are willing to provide data to me and allow me to use the information they provide as results to the study. Their joint advice has given me a lot of confidence to complete this thesis. I thank all lecturers and staff members and classmates at Dedan Kimathi University of Technology for their support throughout my study time.

TABLE OF CONTENTS

DECLARATION ii
DEDICATION iii
ACKNOWLEDGEMENT iv
TABLE OF CONTENTS v
LIST OF TABLES ix
LIST OF FIGURES x
ABBREVIATIONS AND ACRONYMS xi
ABSTRACT xii
CHAPTER ONE 1
INTRODUCTION 1
1.1 Background of the Study 1
1.1.1 Sustainability 2
1.1.2 Sustainable Supply Chain Management 2
1.1.3 Sustainable Supply Chain Management and Performance 4
1.1.4 Global perspective on Sustainable Supply Chain Management 7
1.1.5 Sustainable Supply Chain Management and Tea industries in Kenya 8
1.1.6 Tea Manufacturing Industry in Kenya 9
1.1.7 Kenya Tea Development Agency Factory 12
1.2 Problem Statement 13
1.3 Purpose of the Study 14
1.4 Objectives of Study 14
1.5 Research Questions 14
1.6 Significance of the Study 14
1.7 Scope of the Study 15
1.8 Limitation of the Study 15
1.9 Assumption of the Study 15
1.10 Definition of Operational Terms 16
CHAPTER TWO 17
LITERATURE REVIEW 17
2.1 Introduction 17
2.2 Theoretical Review 17

2.2.1 Theory of Supply Chain Management 17
2.2.2 Theory of Efficiency 18
2.2.3 Theory of Constraints 19
2.3 Empirical Review 19
2.4 Critical Literature and Research Gaps 21
2.5 Conceptual Framework 21
2.5.1 Technology and Supply Chain Management 22
2.5.2 Supply chain Management Practices 28
2.5.3 Inventory Control 32
2.5.4 Environmental Policies 35
2.5.5 Sustainable Supply Chain Management 36
2.5.5.1 Lead Time 36
2.5.5.2 Cost 37
CHAPTER THREE 39
RESEARCH METHODOLOGY 39
3.1 Introduction 39
3.2 Research Design 39
3.3 Population of the Study 39
Table 3.1 Target Population 40
3.4 Sample Size and Sampling Design 40
3.5 Data Collection Instrument 40
3.6 Pilot Study 41
3.6.1 Reliability Test 41
3.6.2 Validity Test 41
3.7 Data Analysis Presentation 41
3.8 Ethical Considerations 42
CHAPTER FOUR 43
RESEARCH FINDINGS AND DISCUSSIONS 43
4.1 Introduction 43
4.2 Response Rate 43
4.3 Pilot Study Results 44
4.4 Demographic information 44

4.4.1 Response by Gender 44
4.4.2 Working Experience 45
4.4.3 Level of Education 45
4.5 Technology Change and Sustainable Supply Chain Management 46
4.5.1 Use Technological Systems in the Factory 47
4.5.3 Frequency of Staff Training on the Use of Technology 48
4.5.4 Influence of Technology Change on Sustainable Supply Chain Management 48
4.6 Supply Chain Management Practices and Sustainable Supply Chain Management 50
4.6.1 Effect of Outsourcing on SSCM 51
4.6.2 Influence of Supply Chain Management Practices on Sustainable Supply Chain Management 51
4.7 Inventory Control Practices and Sustainable Supply Chain Management 53
4.7.1 Effect of Warehouse in the Factory 54
4.7.2 Influence of Inventory Control Practices on Sustainable Supply Chain Management 55
4.8 Environmental Policies and Sustainable Supply Chain Management 56
4.8.1 Mechanisms to Minimize Environmental Pollutions 57
4.8.2 Influence of Environmental Policies on Sustainable Supply Chain Management 58
4.9 Sustainable Supply Chain Management 60
4.10 Overall Multiple Regression Model 60
CHAPTER FIVE 63
SUMMARY, CONCLUSION AND RECOMMENDATIONS 63
5.1 Introduction 63
5.2 Summary of the Finding 63
5.2.1 Technology Change 63
5.2.2 Supply Chain Operational Practices 64
5.2.3 Inventory Control Practices 64
5.2.4 Environmental Policies 64
5.3 Conclusions of the Study 65

5.4 Recommendations of the Study 66
5.5 Areas for Further Research 66
REFERENCES 67
APPENDIX I: LETTER OF INTRODUCTION 73
APPENDIX: QUESTIONNAIRE 74

LIST OF TABLES

Table 3.1: Target Population ---------- 40
Table 4.1: Results for Response Rate ---------- 43
Table 4.2 Reliability Test Results---------- 44
Table 4.3: Descriptive Statistics of Technology change---------- 46
Table 4.4: Model Summary for Technology Change ---------- 48
Table 4.5: ANOVA for Technology Change ---------- 49
Table 4.6: Coefficients for Technology Change ---------- 49
Table 4.7: Descriptive Statistics of Supply Chain Management Practices---------- 50
Table 4.8: Model Summary for Supply Chain Management Practices ---------- 52
Table 4.9: ANOVA for Supply Chain Management Practices---------- 52
Table 4.10: Coefficients for Supply Chain Management Practices ---------- 52
Table 4.11: Descriptive Statistics of Inventory Control Practices ---------- 53
Table 4.12: Model Summary for Inventory Control practices ---------- 55
Table 4.13: ANOVA for Inventory Control Practices ---------- 55
Table 4.14: Coefficients for Inventory Control Practices---------- 56
Table 4.15: Descriptive Statistics of Environmental Policies---------- 57
Table 4.16: Model Summary for Environmental Policies ---------- 58
Table 4.17: ANOVA for Environmental Policies---------- 59
Table 4.18: Coefficients for Environmental Policies---------- 59
Table 4.19: Descriptive Statistics of Sustainable Supply Chain Management --------- 60
Table 4.20: Model Summary for Factors affecting sustainable supply chain management---------- 61
Table 4.21: ANOVA for Factors affecting sustainable supply chain management--- 61
Table 4.22: Coefficients for Factors affecting sustainable supply chain management 62

LIST OF FIGURES

Figure 2.2: Conceptual Framework---------- 22
Figure 4.1: Gender of the Respondents ---------- 44
Figure 4.2: Working Experience of the Respondents ---------- 45
Figure 4.3: Level of Education of the Respondents ---------- 46
Figure 4.5: Use technological systems in the factory ---------- 47
Figure 4.6: Frequency of staff training on the use of technology ---------- 48
Figure 4.7: Effect of out sourcing on SSCM ---------- 51
Figure 4.8: Effect of warehouse in the factory ---------- 54
Figure 4.9: presence of Mechanisms to minimize environmental pollutions ---------- 58

ABBREVIATIONS AND ACRONYMS

CRM	Customer Relationship Management
ECR	Efficient Consumer Response
EPA	Environmental Protection Agency
EPZA	Export Processing Zones Authority
EWS	Electronic Weighing Solution
GDP	Gross Domestic Product
KEPC	Kenya Export Promotion Council
KPLC	Kenya Power and Lighting Company
KTDA	Kenya Tea Development Agency
KTDA	Kenya Tea Development Authority
RBV	Resource Based View
SCDA	Special Crops Development Authority
SCM	Supply Chain Management
SSCM	Sustainable Supply Chain Management
TBK	Tea Board of Kenya
TCE	Supply Relationship Management
TCE	Transaction Cost Economics
TNC	Trans-national Corporations
TOC	Theory of Constraints
VSM	Value Stream Mapping

ABSTRACT

This study sought to analyze the factors affecting sustainable supply chain management in Kenyan processing factory. The study was guided by the following four specific objectives: to determine the effects of technology change on sustainable supply chain management in Iriani tea factory in Nyeri South Sub County, to examine the effect of supply chain operational practices in sustainable supply chain management in Iriani tea factory in Nyeri South Sub County, to analyze the effect of inventory control practices on sustainable supply chain management in Iriani tea factory in Nyeri South Sub County, to identify the effects of environmental policies on sustainable supply chain management in Iriani tea factory in Nyeri South Sub County and to achieve the objectives of the study, a descriptive survey research design will be adopted. The target population was 120 employees drawn from in Iriani tea factory in Nyeri South Sub County. The study hence employed a census sampling method since all the targeted employees were contacted for data collection. A self-administered and semi-structured questionnaire was distributed to the target population. Primary data was analyzed with the aid of Statistical Package for Social Sciences (SPSS) software to generate frequencies, mean and percentages. Pie charts, graphs and tables were used to present various aspects of the variables. Content analysis was used to analyze qualitative while quantitative data was analyzed using descriptive and inferential statistics. A pilot study was conducted to enhance the validity and reliability of the data collection instrument. Cronbach alpha coefficient of 0.7 was used to ascertain test the reliability of the data collection instrument. Data that was analysed was obtained from 112 respondents out of the targeted 120 achieving 93.3% response rate. Frequencies and percentages were generated from the data and presented using frequency distribution tables while bi-variate linear regression and multiple linear regression were used to study the relation between internal audit effectiveness and the independent variables in the study. The results indicated that technology change and supply chain operational practices had a positive and statistically significant effect on sustainable supply chain management in Iriani tea processing factory. Inventory control practices and environmental policies had a positive but statistically insignificant effect on sustainable supply chain management in Iriani tea factories. In addition, the findings of the study further indicated that technological change leads to reduction of cost of the systems maintenance and reductions of system delays. The study recommends that tea processing factory should consider focusing on technological change with a view to ensure that most of the transactions are done using the computerized systems. Tea processing factory should also adopt several supply chain operational practices such as suppliers partnership and purchases of quality products with the aim of eliminating excess waste. Future research could focus on challenges tea factories in Kenya face when they focus on sustainable supply chain management.

CHAPTER ONE
INTRODUCTION

1.1 Background of the Study

According to, Hakizimana, *et. al*., (2017), agriculture is the main sector in the Kenyan economy. The sector accounts for about 24% of Kenya's Gross Domestic Product, with approximately 75% of the population depending on it, Export Processing Zones Authority (EPZA, 2005). Kenya's main cash crops are tea, coffee, flowers, fruits, pyrethrum, tobacco, sugar, cotton, sisal, and wattle. According to, Kimenyi, (2002), tea, coffee and horticultural products contributed 55% of exports revenue 2003. He argues that good livelihood in the country is as a result of agricultural activities.

Organizations are under pressure by non-governmental organizations to operate in a sustainable manner (Wolf, 2014). Pressure from stakeholders hold an organization accountable for its actions and decisions regarding its product design, sourcing, production and distribution (Wolf, 2014; Parmigiani, et al., 2011). Shrivastava (1995), cited in Carter and Rogers, 2008), that sustainability not only addresses stakeholder pressures, but also reduces long-terms risks associated with changes of energy prices, management of pollution and waste as well as product liabilities.

The benefits of a SSCM is to helps managers identify strategies for an organization's survival and success over long term periods of up to 20 years and more, (Carter & Easton, 2011). It may be referred to as a perspective of the process of supply chain and also technologies that goes beyond delivery, cost and inventory. The theory is based on the products and services that are socially responsible involving practices that are environment-friendly.

The main purpose of this paper is to look at the Kenyan tea sector with a specific focus at Iriaini tea factory in Nyeri south sub county, where many farmers are small scale farmers, with an aim of addressing the sector in a more sustainable way. Many studies done on tea sector have concentrated on tea plantations and have largely ignored the small holder tea sector. It is assumed that companies that utilize sustainable supply chain management as a strategic tool in business management are to be expected to have a competitive edge over others. However, this is contrary to the

Tea Industry in Kenya. The main purpose of this research was to establish the factors affecting sustainable supply chain management in the tea industry in Kenya.

1.1.1 Sustainability

The modern concept of sustainability or Triple-Bottom-Line concept have been prominent since 1987, when "Our Common Future" report was published by the World Commission on Environment and Development (Mebratu, 1998). Sustainability is defined as a development that meets the needs of the current generation without compromising the meeting the demand for future generations (Brundtland, 1987). The triple-bottom-lines: environment, economic and social equity has been identified as the major pillars in the sustainability (Vachon & Mao, 2008). Sustainability can be achieved only when social, economic and environmental aspects move together to achieve long-term economic performance and benefits (Carter & Rogers 2008; Styger, 2010).

1.1.2 Sustainable Supply Chain Management

Carter and Rogers (2008), define sustainable supply chain management as: The strategic, transparent integration and achievement of an organization's social, environmental and economic goals in the systematic coordination of key organizational business processes for improving the long-term economic performance of the individual and its supply chain.

Supply chain management can be defined as a combination of integrated planning, coordination and the control of all processes and activities along the supply chain to provide a value added service while reducing the total cost of all stakeholders in the supply chain (Van der Vorst, Beulens & Van Beek, 2000). According to the supply chain management definition, it is a series of activities and business processes that share and transfer physical materials, information and cash across the chain (Håkansson & Persson 2004). It can be seen that supply chain management is basically a process-oriented management approach where the focus is typically on sourcing, production and delivery of goods and services to the end customer (Harland, 1996).

In a globalized business environment, supply chain management has become important due to the increase focus on overall revenue growth and performance, instead of merely trying to achieve individual cost reductions (Chandra & Kumar, 2000). Many production and servicing firms around the world have identified that transferring cost to other supply chain partners in upstream or downstream nodal points does not increase competitive advantage of the focal firm (Harland, 2016). Supply chain management concept typically moves towards redesigning the supply chain to maximize efficiency and effectiveness of materials and information flow (Alvarado & Kotzab, 2001). Earlier, more focus has been placed on strategic alliances between partners in the supply chain (Cigolini, Cozzi & Perona, 2004; Woods, 2004). In the 1980s the basis for competition had been on flexibility in production, time and quality of goods with fewer inventories (Tan 2001). However, with increasing customer awareness, delivering defect free products, faster and on-time, became a necessity to achieve a threshold position and not necessarily a competitive advantage (Mentzer, DeWitt, Keebler, Min, Nix, Smith & Zacharia 2001; Kleindorfer, Singhal & Van Wassenhove, 2005). During this period Efficient

Consumer Response (ECR) and Customer Relationship Management (CRM) were an important focal point of supply chain management. ECR tries to improve the relationships between producers and distributors (Hill 2000). CRM tries to increase the relationship with the major customers while increasing the value offered to both customers and suppliers (Payne & Frow, 2005). Managing the supply chain risk impose extra pressure with increasing the globalisation (Kleindorfer, Singhal & Van Wassenhove, 2005). Kleindorfer et al. (2005) pointed out that the current trend has moved towards the sustainability of operations management. Figure 1 illustrates the evolution of value chain restructuring from 1980 – 2010.

Competitive strategy and supply chain strategy has a strong relationship with the sustainability. Depend on the external business environment, supply and demand characteristics, a company needs to define the corporate strategy and the competitive strategy. To achieve the expected competitive advantage, it is necessary to define the supply chain strategy implemented and it will result in various supply chain operations (Cohen & Roussel, 2005). These supply chain operations create more

issues in social, environment and economic area with imposing extra pressure on companies to refine their strategies. Therefore, supply chain strategy serves as the bridge between corporate strategy and sustainability. Furthermore, the impact of sustainability goes beyond individual territory (Foran, Lenzen, Dey & Bilek, 2005) and the scope of sustainability has expanded beyond the processes and corporate boundaries (Fiksel, 2010). For sustainability to occur, consideration must extend beyond the firm's own operations and into the entire supply chain. Glavic and Lukman, (2007) highlighted that terms such as minimizing waste, pollution control and prevention, global warming, depleting natural resources and minimizing the use of natural resources were some terms that were already in use which has conferred extra emphasis on sustainable development (Linton, Klassen & Jayaraman, 2007). Carter and Rogers, (2008) define sustainable supply chain management as: The strategic, transparent integration and achievement of an organization's social, environmental and economic goals in the systematic coordination of key organizational business processes for improving the long-term economic performance of the individual and its supply chain. Typically, sustainable supply chain management is now considered to be the "best way" to improve efficiency in supply chain (Miller, 2008). Hence, supply chain managers who were once more concerned with inventory reduction, ECR, CRM practices are now tending to look at more tangible benefits related to the economic, environmental and social aspects in supply chain management (McCue 2010). A firm that implements a sustainability concept not only considers it as an opportunity meet the social needs, but also as strong tool to achieve competitive advantage (Mahler, 2007).

1.1.3 Sustainable Supply Chain Management and Performance

Supply chain performance is defined as "the degree to which a supply chain meets end-user and stakeholder requirements concerning the relevant performance indicators at any point in time" (Christien *et. al.*, 2006). Miller (2008) highlighted that efficiency and environmental friendliness walk together towards improvement. There are many drivers that would have a direct impact on sustainable supply chain management. These drivers are discussed below:

1.1.3.1 Uncertainty and Risk

Risk has been an inherent feature of any supply chain. It can be defined as a threat that faces any supply chain that disrupts the resource flow or events that stop things happening as scheduled (Waters, 2009). Risk can be external which are uncontrollable (such as natural disasters) or internal which are normally related to supply chain operations and often controllable by managers. Risk and uncertainty has become a common feature for all sectors, however, with globalization, the complexity and the vulnerability to risk in supply chains has increased (Pai, Kallepalli, Caudill & Zhou, 2003). Uncertainty in the agricultural sector an important, and extra pressure, is placed on the sector due to: climate change, capacity of farmers, lack of resources, volatile markets and policy changes (Ameseder, Canavari & Cantore, 2009). Therefore, addressing the risks in an environmental, social and economic context is a major challenge within a sustainable supply chain management strategy.

Studies have shown that operations management and operational performance are linked. Chaves *et. al.*, (2013) studied the operations management aspect of lean internal practices in manufacturing firms located in Ireland where they established that this has an effect on the operational practices elements of quality, delivery, flexibility, and cost. Feng *et. al.*, (2013) in his study of Chinese manufacturing companies found that internal business activities like the operational practices has influence on sustainable supply chain management. Many businesses are undertaking various sustainability initiatives like the supply chain sustainability to mitigate the adverse environmental and social impacts of their firm operations (Varseiet *et. al*., 2014).

Both buyer and supplier actions can impact on the company's operations. This has led to businesses forming buyer-supplier collaborations to ensure they get the right specification of materials to better their product offering and streamline operations. Buying from green suppliers and the use of green energy is one of the upcoming supply chain trends in an attempt to have minimal negative impact on the environment (Orji and Wei, 2015). Quality can be seen in the perspective of the customer or from the company’s perspective (Pham and Thomas, 2012).

Quality can be essential, performance or exciter quality. Quality management can lead to the introduction of new high-value products that can competitively compete in the market (Kafetzopouloset *et. al.,* 2015). Firms have to define what their quality approach is since it can affect how the customers think of the organization and how the staff carries out their duties (Kashou and Omran, 2014). The processes level involves the process design, planning and control and thesis management. Process design implies a plan of how the work will flow, the equipment to use and how the work will flow in the production process to be a finished product (Nembhard, 2014).

The process design in a factory will depend on the type of product being produced and what the management prioritizes. This helps an organization to be organized in their processes for smooth movement of materials and staff. These underscore the need of identifying the factors that affect sustainable supply chain management in Iriani tea factory at Nyeri South, Othaya.

1.1.3.2 Law and Regulations

The environment represents the "public good" which is defined as shared benefits for all in the society. Research shows that many market systems easily ignore the public good. Hence government invention is essential to motivate corporations to minimize environmental and social damages from their operations (Bhat, 2008). Compliance to law and regulations are now trending in favour of sustainability frameworks, however, environmental laws vary from country to another making the compliance to individual laws complex in a globalized economy (Nidumolu, Prahalad & Rangaswami, 2009).

1.1.3.3 Innovation and Knowledge

Innovation is about doing things differently and efficiently. It is the development and exploitation of new ideas rather than just an inventing a new idea or concept (Tidd & Bessant, 2009). Innovation does not need to be associated with sophisticated technology. It can vary from an incremental innovation to radical technological and design driven innovation (Verganti, 2009). Innovation should deliver environmental benefits if implemented correctly (Bha, 2008). Nidumolu *et. al*., (2009) emphasizes that innovation in technology, production processes and raw materials offer some

opportunities to increase the sustainability of any business, however, innovation appears to be lacking in the grass roots of many supply networks (Styger, 2010).

1.1.3.4 Lean Manufacturing

Many organizations have adopted lean manufacturing with the hope of optimizing their resources (Karim and Arif-Uz-Zaman, 2014). A lot of studies have been done on lean manufacturing and advocate for its use. Lean manufacturing aims at the elimination of waste in every area of production, including customer relations, product design, supplier networks and factory management. Chauhan and Singh, (2012) identify the benefits of lean manufacturing as bringing in automation, less inventory, less time wastage, and less space to produce quality products efficiently and economically. The benefits are seen in the long run thus identifying that Lean management is not a quick fix solution. According to Pham and Thomas, (2008) lean manufacturing eliminates waste, and agile manufacturing helps deal with uncertainty through flexibility and responsiveness.

1.1.3.5 Value Stream Mapping

Mobley, (2013) identifies Value Stream Mapping (VSM) as a visual way of depicting and improving the flow of manufacturing and production process, also the information that controls the flow of materials through the process. According to Librelato *et. al.*, (2014) using VSM, a company can map out its value chain's productive processes and information flow. VSM main contributions are in the identification of process wastages and simplification of data along operations. Value Stream Mapping advocates for continuous improvement in the production system.

1.1.4 Global perspective on Sustainable Supply Chain Management

With globalization, there has been an increasing interdependence across national and geographical boundaries of people Wamalwa, (2014). The intensity of competition has increased tremendously and there has been growing demands for flexible and cost efficient systems that can support customer differentiation. There are increasingly complex consumer demands, changing global regulatory regimes and increased concerns over products safety and security. Import restrictions have been put on the companies that fail to manage sustainably its supply chain and with the emergence of

new types of inter-organizational relationships. Companies have entered into a new era of understanding the dynamics of competitive advantage and the role played by supply chain management (Premkumar *et. al.,* 2006).

Supply chain management has become increasingly crucial due to fewer companies being vertically integrated, increased competition, the increased realization of the effect that one entity has on the entire supply chain, greater emphasis on flexibility, and the need to produce new products more quickly (Lummus, 1999). Supply chain management (SCM) approach is progressively recognized by many organizations as a strategy to attain their business goals today (Chin et. al., 2004; Altekar, 2005). Enhancing supply chain performance is a critical approach for achieving competitive advantages for companies (Cai, Xiao, & Liu, 2009).

Environmental degradation, global poverty, lack of human rights, far-reaching health deficits and corporate governance resulted in sustainable supply chains management (SSCM) to emerge as key enabler that could push organization to focus on alleviating environmental issues, providing economic and social benefits (Govindasamy, 2010). Through sustainable supply chain management, companies can realize significant additional profits by acting within the triple sustainable issues of social, environmental and economic. In tea industry, the demand from customers is always variable or changing which is hard to anticipate and Customers are used to requiring products in a short time frame whenever they increase demands without prior alignment with the company. This means that companies have no power to shape the relationship with the supplier and must accept quality, price decision and terms and conditions that are dictated by the supplier Journal of Management and Sustainability *et. al.,* 2003). A closer relationship enables the participating companies to achieve cost reductions and revenue enhancements as well as flexibility in dealing with supply and demand uncertainties (Bowersox, 1990; Lee *et. al.,* 1997).

1.1.5 Sustainable Supply Chain Management and Tea industries in Kenya

Before Kenya attained independence, indigenous Kenyans were barred by law from growing tea. When it approached independence, the legislation was repealed to allow the indigenous people to commence tea growing. Following this development in 1960, the colonial government created the Special Crops Development Authority

(SCDA) to promote growing of tea by Africans under the auspices of the ministry of Agriculture Kathure, (2014).

After independence, Kenya Tea Development Authority was formed through legal notice No.42 of 1964 and took over the liabilities and functions of the SCDA to promote and foster the growing of tea in small farms, which were previously said to be unviable in view of the expertise and costs required, as witnessed in the plantation sector Burugo & Owour, (2017). Due to privatization, Kenya Tea Development Authority was converted to Kenya Tea Development Agency Limited and was incorporated on 15th June 2000 as a private company under (CAP 486) of the laws of Kenya, becoming one of the largest private tea management agencies (KTDA, 2013), Mbeche & Dorward, 2014). KTDA offers management services to the small scale tea Subsector in Kenya. The company is managed by a board of directors from the twelve zones that represent the tea growing regions of Kenya. Each zone has a collection of Factories. A factory has six directors that are elected by farmers. The elected directors meet at the zonal level to elect a board member to KTDA. There are sixty five factories under the management of 6 KTDA.

All factories are managed in a similar business model. The company has a responsibility of buying tea leaves from small scale farmers, processing of the tea and ensuring the same is market appropriately. All these activities involve value addition and complex supply chains that need good supply chain management practices at both the upstream and downstream levels Kathure, (2014). Without proper supply chain management practices, KTDA factories may not be able to operate profitably since their supply chain activities may be derailed thus leading to losses (KTDA, 2013).

1.1.6 Tea Manufacturing Industry in Kenya

The tea (Camelia sinensis) was introduced in Kenya by Caine, G. W who was European settler. Caine planted the first seedling in Limuru near Nairobi as early in 1903 (Tea Board of Kenya, 2010). Kenya is the third major producer and the key exporter of tea in the world at twenty three percent (23%) of the total tea produced in the world (Tea Board of Kenya, 2010). The power in the Global tea industry is concentrated in the hands of four trans-national corporations (TNCs) of which two are actively involved in tea industry in Kenya. These companies include Unilever and

James Finley. Other companies in Kenya that are in tea industry include Vanrees Company, Ketepa Company Ltd and Lab International. Benoit & Peter, (2002) asserts that these TNCs invest more in branding and marketing at the expense of transformation in production and labor processes and their goal is to maximize the profits even if this requires downsizing the work force (Wamalwa, 2014).

The Kenyan tea is majorly grown in the areas that are endowed with ideal climate that has tropical volcanic red soils. The rainfall distribution in this areas ranges between 1200mm to 1400mm per annum. Farmers in this area apply fertilizers in their tea farms to replenish soils (Tea Board of Kenya, 2010). The tea production in Kenya is undertaken by large scale sector and the small scale sector. The large scale sector is owned by large scale tea producers and companies mostly multinationals while the small holder sector is owned by local small scale growers (Glover & Kusterer, 2016). These Small scale holders produce and sell their tea through the Kenya Tea Development Agency which is the largest single tea agency in the globe with sixty two tea factories (Daily Nation, Sunday 25 April 2010). Small scale farmers use family labor in planting, plucking and delivery to collection centers.

According to Kumar *et. al.,* (2014), Kenya is the fourth-largest producer of tea worldwide, and is the only country in Africa to produce a substantial amount of tea for the world market (Tea Board of Kenya, 2014). It also has recently emerged as a major source of innovation in new varieties of tea and single-origin artisan teas. Unlike India and Sri Lanka, where most tea is grown on large plantations, 90% of tea in Kenya is grown on farming operations of 1 acre or less. Tea is central to Kenya's economy; tea exports represent 26% of total export earnings and about 4% of GDP.
Tea farmers in Kenya have become strained due to competition; rather than move towards larger operations, Kenya has decided to invest money in research and development of new varieties of tea that have the potential to have higher yield and more resilience to variable climactic conditions. About 60 % of the tea in Kenya is produced by small-scale farmers. These farmers then sell their produce through the Kenya Tea Development Authority, the body in charge of collecting and processing the tea leaves, who in turn sell it to the outside market through the auction process or by direct sales and other private factory offers Thomas, (2015). Some small-scale

farmers also sell their teas directly to consumers, private buyers and importers/exporters without necessarily going through the normal auction process.
The remaining 40 % of Kenyan tea is grown on large scale on, privately-owned farms. The owners of these farms process and then sell their tea through the Mombasa Tea Auction, the second largest tea auction in the world. Tea from Kenya is bought and exported as straight-line pure Kenyan tea blended, packaged, lose or as per specific market or customer requirement. All tea bought from the Mombasa Tea Auction or through direct sales and other private arrangements is then exported to Egypt, United Kingdom, Unites States, Pakistan, Afghanistan, Sudan, India, China and many other international destinations for sale in those markets.

According to Szenthe, (2015) Kenya is the third largest world producer of tea after China and India. In Africa, Kenya is the largest African producer of tea, with most of its product being exported to other countries. The majority of tea leaf suppliers are small-scale farmers, under the umbrella of the Kenya Tea Development Agency (KTDA), a private incorporation dealing majorly in the tea industry. It handles the collection of leaf from the suppliers, processing the leaf and selling the final product. The tea suppliers are also the shareholders of the company. Large populations of tea farmers depend on this produce for their livelihoods. They take their leaf to designated collection points where the factory collects it for processing at the plant (Edington, 2017).

There are many factories spread around the regions, Iriani tea factory being one of them. Their factory operations involve activities from attaining raw materials from the supplier who doubles up as the shareholder, processing and packaging of the leaf to selling the final product to the customer. In the tea industry, companies have the most influence when it comes to improving the sustainability of tea supply chains. Some see the value of creating corporate social responsibility beyond certification. In order to make sure sustainability is not only a word on the lips of farmers and workers, but also in board rooms.

Expansion into new markets is a fundamental part of the EATTA's most recent five year strategic plan, and members of the EATTA have expressed specific interest in

accessing the U.S. market. Between 60% and 70% of East African tea exports currently go to the UK, Pakistan, Afghanistan, Egypt and Sudan. The impact of destination markets' political and economic uncertainty on sales has motivated stakeholders to seek expansion. Recent entrants include West and Central Africa and members of the Commonwealth of Independent States, including Russia. The Kenya Export Promotion Council plans to open a warehouse at the Dubai Tea Trading Centre, where tea from around the world is warehoused, bought, blended and packed (Burugo & Owour, 2017). It is unclear whether the centre would be more likely to attract direct sales from East Africa or, since it lacks its own public pricing mechanism, emerge as a new destination for tea bought at the Mombasa auction.

Almost all of Kenya's tea is currently exported as a bulk commodity, so value addition has been prioritized by the EATTA and the government, including President Uhuru Kenyatta. Examples of tea value addition include manufacturing tea bags, instant tea, and read to drink tea, building a brand around the country of origin, and producing green, white orthodox, purple and other tea varieties. No matter how great the business strategy, if the operations function can't meet the mark, its game over. Deloitte's Supply Chain and Manufacturing Operations practice is a leader in helping companies integrate business strategy with supply chain initiatives to drive operational excellence. Our deep industry experience encompasses new product development, inventory strategy and integrated demand planning, sourcing and commodity management, manufacturing footprint strategy and operations, distribution network and logistics optimization, and sustainability (Formentini & Taticchi, 2016). We employ programmatic approaches, leverage analytics capabilities, and offer managed services that can help improve top-line growth, lower costs, reduce response times and increase productivity (Schlegel & Trent, 2014).

1.1.7 Kenya Tea Development Agency Factory

The actual supply chain of a KTDA factory begins with the farmer who is the supplier of green leaves. The green leaf leaves the farm and it is transported by the farmer to a tea collection centre where weighing is done using an Electronic Weighing Solution (EWS). The green leaf is then transported to the factory using tea collection trucks. At the factory the green leaf is received and the weight is confirmed before processing

begins. Once the processing is completed, the processed tea is packaged and transported to a Mombasa warehouse where auction is done and the tea ends up either with a local or international buyer. The KTDA factories obtain inputs such as fertilizers and machinery from India; spares are obtained from both international and local manufacturers and energy is mainly from KPLC (Ngatia & Chirchir, 2013).

1.2 Problem Statement

Supply chain management efficiency, effectiveness and sustainability have profound implications on any organization's ability to meet its customer's demands, its reputation, and its overall financial success (Waters & Rinsler, (2014) and (Ambe, 2009). Supply chain management inefficiency presents the single biggest opportunity for operational inefficiencies in any organization Feldman (2003). There has been a rise in complaints by the public, professionals and other stakeholder's about the supply chain management performance within tea industries in Kenya. The opinion of many is that supply chain management within the organization way below the stakeholders' expectations (Transparency International, 2014). A strategic partnership between a supplier and the buyer emphasizes direct, long-term association and encourages mutual planning and problem solving efforts (Gunasekaran *et. al*., 2001). Industries in Kenya have for a long time been struggling with serious issues of poor supplier management where cases of malpractices have been reported since the relationship existing is not based on trust and commitment which has affected the level of service delivery offered and more so efficiency and effectiveness of the supply chain management (World Bank, 2013). Institutions information sharing is rigid because of the bureaucratic structures and overreliance on manual ways of communication which has affected supply chain management performance because of delay of information from one entity to the other (KNBS, 2014).

Whereas it is clear that execution of supply chain management has an impact on the outcome of tea supply in Kenya and globally, the question still remains as to which specific factors affect the performance and sustainability of the supply chain management that have the greatest effect. This study thus sought to investigate the factors affecting sustainable supply chain management in tea processing companies in

Kenya. To address this question, the study specifically focused on factors affecting the sustainable supply chain management in Kenyan tea processing industries.

1.3 Purpose of the Study

The general objective of the study was to assess the factors affecting sustainable supply chain management in Kenyan tea processing factory with particular focus on Iriani tea factory in Nyeri South Sub County.

1.4 Objectives of Study

i. To determine the effects of technology change on sustainable supply chain management in Iriani tea factory in Nyeri South Sub County.
ii. To examine the effect of supply chain operational practices in sustainable supply chain management in Iriani tea factory in Nyeri South Sub County.
iii. To analyze the effect of inventory control practices on sustainable supply chain management in Iriani tea factory in Nyeri South Sub County.
iv. To identify the effects of environmental policies on sustainable supply chain management in Iriani tea factory in Nyeri South Sub County.

1.5 Research Questions

This study sought to answer the following research questions;

i) What are the influences of technology change on sustainable supply chain management in Iriani tea factory in Nyeri South Sub County?
ii) To what extent do supply chain operational practices affect sustainable supply chain management in Iriani tea factory in Nyeri South Sub County?
iii) How does an inventory control practice affect sustainable supply chain management in Iriani tea factory in Nyeri South Sub County?
iv) To what extent does an environmental policy influence sustainable supply chain management in Iriani tea factory in Nyeri South Sub County?

1.6 Significance of the Study

This may be of great significance to a number of stakeholders among them tea factory managers and future researchers. The tea factory managers were expected to benefit immensely from the findings of this study as it may challenge them to embrace the

supply chain management systems and factor in factors affecting supply chain, to enhance the operational performance of the tea factories they manage thus increase their competitive advantage in ever changing business environment. This study also will make available literature on the factors affecting supply chain management of tea processing firms for future researchers since the topic may not be thoroughly researched. This will bridge the gap of contingency issues in supply chain management.

1.7 Scope of the Study

The main purpose of the study was to assess the factors affecting sustainable supply chain management in tea manufacturing industries in Kenya with particular focus on Iriani tea factory in Nyeri South Sub County within Nyeri county Kenya. The study was carried out in Iriani tea factory in Nyeri South Sub County within Nyeri county Kenya which covered all the management employees' cadres. The researcher targeted 120 management levels employees in the whole factory who includes factory unit managers, production managers; factory accountants field service coordinators, production assistants and assistant factory accountants.

1.8 Limitation of the Study

The researcher anticipated a limitation in accessing information as many institutional departments were not openly willing to give true information freely to anybody. Hence the researcher assured the respondents that the findings of the study would be used for academic purposes only. Moreover, since some institutions have working structures and policies that are so procedural, the researcher hoped that this assurance would enhance management and staff acceptance to divulge the relevant information for the study. It was also assumed that the variables for the study would not change during the course of the study.

1.9 Assumption of the Study

The researcher assumed that the respondents would be honest, provide valid**,** reliable information, offer the researcher maximum cooperation and help in reaching at fruitful quality end of the research. Also the researcher assumed that the management had good records from which the information would be driven from to suite the need

and questionnaires would be returned on time and that variables would not change in process of the study.

1.10 Definition of Operational Terms

Cost - This is the value of money that has been used up to produce something and hence not available for use anymore (Tate, 2013).

Lead Time - This is the period of time between the initial phase of a process and the emergence of results, between the planning completed manufacture of a product (Thapa, 2014).

Lean Manufacturing - This is a systematic method of waste minimization with the aim of optimizing resources (Mishra, 2014).

Risk- These are the threats that face any supply chain, disrupt the resource flow or events that stop things happening as scheduled (Layzer, 2015).

Supply Chain Management - This is the integration of planning, coordination and the control of all processes and activities along the supply chain to provide a value added service while reducing the total cost of all stakeholders in the supply chain (Christopher, 2016).

Supply Chain Performance - This is the degree to which a supply chain meets end-user and stakeholder requirements concerning the relevant performance indicators to any point in time (Farrington, 2012).

Sustainability - This is the development that meets the needs of the current generation without compromising meeting the demand for future generations (Edington, 2017).

Sustainable Supply Chain Management - This is the strategic, transparent, integration and achievement of an organization's social, environmental and economic goals in the systematic coordination of key organizational business processes for improving the long term economic performance of the individual and its supply chain (Kusterer, 2016).

Value Stream Mapping - This is a visual way of depicting and improving the flow of materials, production process, as well as information that controls the flow of materials through the process (Ross, 2016).

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

This chapter discusses the relevant literature that has been reviewed in the area of supply chain management success factors by other researchers. The literature review consist the theoretical part, Empirical review, Critical literature and research gaps, as well as a conceptual framework.

2.2 Theoretical Review

This section will discuss the theoretical overview of existing theories in supply chain management and literature, relevance to SSCM. Theoretical overview is conducted in regard to three theories namely; Theory of supply chain management, theory of efficiency and Theory of constraint.

2.2.1 Theory of Supply Chain Management

The connections and nodes in a Supply Chain achieve functions that contribute to the value of the goods transporting through the chain and thus its achievement. Any connection that does not carry out well reduces the overall effectiveness of the whole Supply Chain. The notion of Supply Chain management as used in many research is usually linked with the globalization of producing and the penchant for manufacturers to source their inputs planetary, which necessitates management of profitable ways of regulating worldwide flows of inputs or outputs. The principal focus of market competition in such situations is not only between goods, but between the Supply Chains delivering the goods. As competition in international markets is progressively dependent upon the of arrival time of goods as well as their quality, coordination between suppliers and distributors has become an important characteristic of the Supply Chain. As the customer satisfaction is a crucial benchmark of the success of the Supply Chain, effective management of the linking processes is crucial (Trkman, Stemberger & Jaklic, 2005).

Additionally, market uncertainty necessitates Supply Chains to be easily flexible to changes in the situation of trade. Such flexibility in supply requires effective Supply

Chain Management. According to Grant, Lambert, Stock and Ellram (2006), Supply Chain management refers to corporate business processes integration from end users through suppliers that provide information, goods, and services that add value for customers. Supply chain can be summed up as a series of interconnected activities which are concerned with planning, coordinating and controlling materials, parts and finished products from supplier to customer (Lourenco, 2001). The key success of SCM will rely on the incorporation of the activities of the supply chain, meaning cooperation, information sharing and organization throughout the entire supply chain. The supply chain in the oil industry is considered a complex one where there exists a linkage between upstream suppliers, downstream distributors, information capital and flow through the chain.

2.2.2 Theory of Efficiency

In economics, the term economic efficiency refers to the use of resources so as to maximize the production of goods and services (Sullivan and Shefrin, 2003). An economic system is said to be more efficient than another (in relative terms) if it can provide more goods and services for society without using more resources. In absolute terms, a situation can be called economically efficient if: No one can be made better off without making someone else worse off (commonly referred to as Pareto efficiency), No additional output can be obtained without increasing the amount of inputs, Production proceeds at the lowest possible per-unit cost. These definitions of efficiency are not exactly equivalent, but they are all encompassed by the idea that a system is efficient if nothing more can be achieved given the resources available. Efficiency advocates a greater role for government in one sphere or the other (Barr, 2004).

A market can be said to have allocative efficiency if the price of a product that the market is supplying is equal to the value consumers place on it, represented by marginal cost. Because productive resources are scarce, the resources must be allocated to various Industries in just the right amounts, otherwise too much or too little output gets produced. When drawing diagrams for firms, allocative efficiency is satisfied if the equilibrium is at the point where marginal cost is equal to average revenue. This is the case for the long run equilibrium of perfect competition.

Productive efficiency is when units of goods are being supplied at the lowest possible average total cost. When drawing diagrams for firms, this condition is satisfied if the equilibrium is at the minimum point of the ATC curve. This is again the case for the long run equilibrium of perfect competition (Barr, 2004).efficiency, some advocating a greater role for government in one sphere or the other (Barr, 2004).

2.2.3 Theory of Constraints

The Theory of constraints (TOC) is pioneered by Eliyahu Goldratt .It identifies that organizations' resources are limited. It can be used to find the root of variables limiting the organization's performance. The theory states that every system, no matter how well it performs, has at least one constraint that limits its performance-this is the system's weakest link (Manktelow, 2015). Companies must identify these limitations and eliminate them to attain smooth operations. It is based on limitations of organizational and market variables (Librelato *et. al.,* 2014). Companies can use this theory to apply into their operations. They can identify the aspects that need change, what to change into and how the changes can be implemented. According to Librelato *et. al.,* (2014) TOC is proved to be useful for management in their production processes.

2.3 Empirical Review

Research on sustainable supply chain management (SSCM) is still at the development stage. Gold *et. al*., (2010) referred that "literature on SSCM is still limited, and literature reviews are scant" (p.231). Seuring and Muller (2008), also concluded that SSCM "literature is still limited in quantity, and no major reviews of the field has been conducted". As part of their vast scan of 191 papers written in period of 1994-2007 on SSCM, only seven encompassing literature review articles were identified.

Carter and Rogers (2008), concluded that substantial body of SSCM literature is restricted to specific environmental issues as green product development, logistics, waste treatment and human rights, and therefore provides narrow perspective on what SSCM represents. Different environmental issues are addressed as single entity without consideration of the potential interrelationships" between environmental, social and economic issues (Carter and Rogers 2008: p.360). Seuring and Muller, (2008) have also highlighted that research in SSCM "is still dominated by

green/environmental issues", with "a clear deficit in supply chain management and purchasing literature on the amalgamation of all three dimensions of sustainable development" (p. 1702). Social issues and sustainability as integration of economic, environmental and social concerns are still rarely addressed. Interestingly, integration of three aspects of sustainability in academic literature has generally occurred since 2002 (Seuring & Muller, 2008).

Together with inconsistency in defining sustainability, the level of theory development in SSCM field can be defined as immature. Despite numerous calls for more theory development in supply chain management research, there has been, respectively, little theory building research appearing within the broad of supply chain management to date (Carter & Rogers, 2008). Seuring and Muller (2008), have also concluded that "there is a deficit in the take-up of theoretical background, both from within supply chain or operations management, as well as from a wider perspective, such as new institutional economics or strategic management". Authors have also argued that empirical research needs to build on a stronger theoretical basis, although case studies and surveys themselves represent opportunity for theoretical development (Seuring & Muller 2008).

While most of the literature reviews elaborate on the conceptualization of available to date literature in the field of SSCM (Carter and Rogers 2008; Seuring and Muller 2008; Gold, Seuring *et. al.*, 2010), conceptual theory building is considered as pre-theory (middle level of theoretical development), requiring further testing against reality in case specific contexts towards further theorizing (Carter and Rogers, 2008).
Moreover, paradigm shift in supply chain management towards sustainable sourcing initiatives has resulted in the consequent change of the business behavior in regard to purchasing strategies and relationships with suppliers. As result, traditional theories (e.g. resource-based view of the firm (RBV), transaction cost economics (TCE), Kraljic purchasing portfolios etc.) fail to provide a comprehensive explanation of corporate behavior and business strategies when it comes to managing sustainability issues in supply chain. For instance, according to the literature review conducted by Pagell, Wu *et. al.*, (2010) the current theory in supply chain management may neither

adequately explain nor predict the behavior observed with respect to sustainable sourcing.

2.4 Critical Literature and Research Gaps

Following the highlight cited above in the empirical review, it is therefore eminent that, current research in SSCM lacks consistency in defining sustainability and highlighting factors affecting sustainable supply chain management in Kenyan tea industries today. The aim of this paper is therefore to:

To provide a comprehensive understanding of sustainability and explaining sustainable supply chain management in Kenyan industries today. To explore on relevant concepts, models and theories in the field of supply chain management and buyer-seller relationships.

This study represents the literature overview of relevant concept and theories in the field of sustainable supply chain management and contributes to framework development for further research.

2.5 Conceptual Framework

A conceptual framework is a visual representation of ideas showing a presumed relationship among the factors as presented in Figure 2.1 below. The ideas are organized in an easy and understandable way. This research aims to find the relationship between the variables and parameters. The researcher put into consideration the key factors in relation to factors affecting sustainable supply chain management in Kenyan processing factory. They include; technology and innovation, supply chain management practices, inventory control and environmental policies. The researcher assessed the association of the dependent and independent variable.

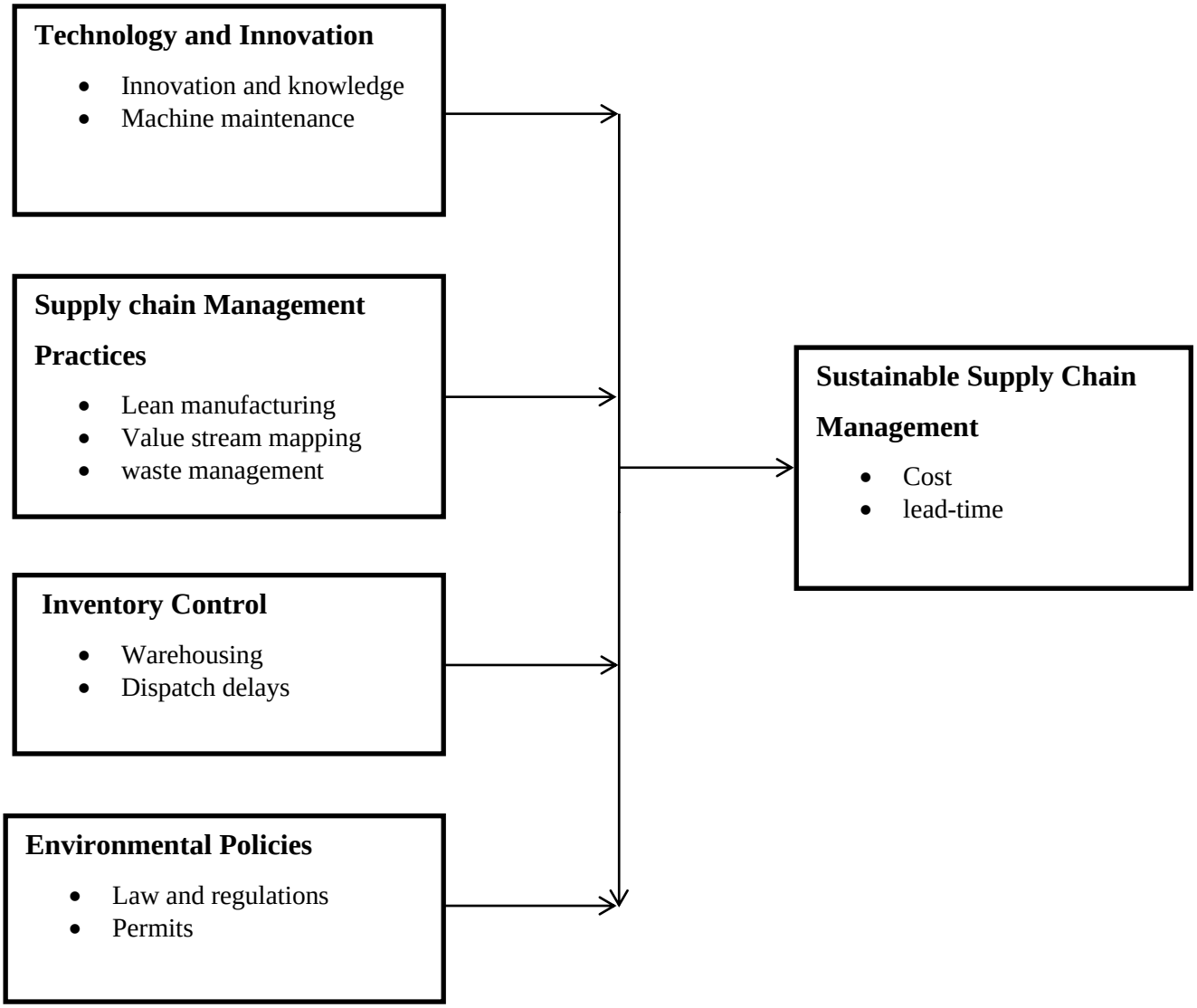

Figure 2.1 Conceptual Framework

2.5.1 Technology and Supply Chain Management

As recently as 20 years ago, supply chain management was seen as something that took place behind the scenes without dedicated staff and resources, Mishra, (2014). According to Mangan & Lalwani, (2016), technology was regarded as a necessity for only the largest brands or companies with international distribution. When there was a disruption to the supply chain, the fix was easy-a company would pull a couple of people from whatever they were doing and put them on the problem. Once the kinks were ironed out, those people could go back to the irregular jobs

In those days consumers were less demanding, less aware and certainly more patient, as they weren't familiar with online ordering with the ability to track shipments to a timely and expected delivery date. Even items that were custom built, beginning when an order arrived via the U.S. Postal Service, were handled with an understanding that completion and delivery would be unpredictable Mishra, (2014).

According to Thapa, (2014) in his book, adoption of new technology in supply chain management: argues that Supply chain management has been around at least as long as the assembly line, but until recently, the concept of a chief supply officer has been foreign. Now that role is seen as a highly strategic one that is increasingly valuable from both a customer service and a business perspective. As the role has evolved it's become a critical one, as managing a supply chain is complex, fraught with risk, subject to complex regulations, fines, competition, international shipping restrictions, and more. As the internet, email and other technologies have become ubiquitous, the expectations of consumers have grown correspondingly Xiang, *et. al.,* (2015). Today's companies are increasingly global and complex, with competition growing on every front and acquisitions that change business processes taking place with astonishing frequency. At the same time, roles and responsibilities within companies have expanded and become more specific. Mishra, (2014), in his book, Role of Information Technology in supply chain management highlighted that the new technologies skills have become more specific, and companies are much less likely to want to pull people from important jobs to focus their attention on supply chain problems.

The supply chain itself has become increasingly complex, with a higher number of ingredients and components leading to a finished product, and with a broader and more widespread base of suppliers. It's clear that monitoring the path of goods using tax on a map no longer works (Black, 2017). Technology has crept into SCM step by step, beginning with electronic invoicing, computerized shipping and tracking and automated notifications that were advanced by companies like FedEx and UPS. Initially intended for business-to-business interactions, it took time before that level of tracking and accountability was provided to consumers. But even in those early days it was clear that the ability to notify everyone along the chain was important (Thapa, (2014).

It wasn't until customer-focused companies like Zappos, the online retailer with the tagline "Powered by Service," came on the scene that consumers got a taste of how involved they could be with their purchases. Online natives like Zappos, didn't start with brick-and-mortar stores, so rather than having to adapt to new technology, they were born into the arms of it (Asmuni, (2015). Consumers love these businesses because they can see immediately that their orders have been received, they are notified when orders are shipped, and they can track their purchase every step of the way. Before they order, they can read extensive reviews of the products they are about to purchase, as well as the company they are about to purchase from. This has set a new standard for online customer service; companies that can meet or exceed that standard have a distinct competitive advantage. According to Chaudhuri, (2015) companies like Apple and Harley Davidson use that advantage to further personalize the purchase experience by taking custom orders, then building a product to the exact customer specifications.

That same kind of tracking and accountability can be applied to virtually every link in the supply chain to provide a moment-by-moment snapshot of how goods are moving around the planet. This is the aim of a supply chain manager, to know where inventory is and to anticipate delays and hitches before they affect the final assembly line Mishra, (2014). And just as technology has provided the business landscape with many more capabilities; it has contributed to a new recognition of supply chain management as a profession and a discipline. Today, knowledgeable supply chain managers command respect and correspondingly high salaries Alexander, (2016). Modern supply chain managers understand that technology provides increased visibility and accountability; therefore, a stronger competitive edge and tight control of supply the chain is worth the investment Ross, (2016).

Key to this kind of efficiency is the ability to notify everyone along the supply chain when things aren't going exactly as planned. Notification technology has adapted along with SCM to provide an easy way to send one message to many at once, by a wide variety of devices. So employees at desks will get a call and an email, and someone out in a plant will get a text sent to their smartphone. When the information

is shared in real-time, it allows teams to adapt and changes to suit the situation, helping to keep manufacturing lines on time and on track Mishra, (2014).
As an example, one company that manufactures condiments that are packed in glass jars received a shipment of bottles that seemed fine, but revealed a visible flaw after being filled. The product was packed, labeled and shipped to retailers before the flaw was discovered, and the entire lot had to be recalled. With notification technology in place, the complicated task of issuing a recall was completed in minutes. The manufacturer notified everyone along the chain by sending a single automated alert. Whether the goods had shipped to a dozen or a thousand customers, tracking ingredients and notifying customers would still take just minutes.

Unfortunately, even though the SCM profession and the technology are burgeoning, many companies are still entrenched in outdated, monolithic systems, using phone, fax and email to communicate throughout their lengthy and complicated supply chains Mishra, (2014). But even these companies feel the pressures of competition and keeping costs down pushing them towards more and better technology and automated processes that provide a way to notify everyone along the chain. The fact that technology with notification has influenced the SCM scene is evident by the increasing trend towards just-in-time inventory management. JIT is a great way to free up cash and increase working capital by letting inventory run down Gao, (2017). This can free up many millions of dollars, not just held in the goods themselves, but in storage, security and management of goods. It also reduces the risk of inventory becoming obsolete while in storage.

JIT also comes with risks, many of which have been starkly illustrated by the earthquake and subsequent tsunami in Japan, which have left global manufacturers scrambling for alternative parts and materials that were impacted by the double disaster Mishra, (2014). The moment that tragedy occurred, alerts began. Supply chain managers quickly used notification to reach everyone along the chain; both suppliers and customers, to assess the situation and reserve materials they knew would soon be in short supply. Suppliers, in turn, could easily respond to these alerts, and those responses were logged, making it easy for supply chain managers to track materials and adapt accordingly.

Despite the risks, JIT manufacturing has become so entrenched that many companies simply can't afford to stock and warehouse as much inventory as they used to. So if the supply chain is impacted, orders are affected or downtime in the plant occurs. Successful JIT relies on a tightly managed supply chain, with the ability to alert suppliers quickly in the case of an increased need for materials or goods. This tight management is only possible when SCM technology is tightly integrated with notification capabilities (Radjou & Prabhu, 2015).

Manufacturing is complicated, and supply chain interruptions can cause inventory levels to plummet precipitously). To maintain a steady flow of ingredients, components and finished goods there must clear communication all along the chain. That requires a solution that is more efficient and sophisticated than sending a mass email or pulling staff to make panick phone calls (Mishra, 2014). When the earthquake and tsunami happened earlier that year, many executives around the world had emergency meetings to assess how the disaster would affect their companies and determine what they could do to minimize that impact. Those who had a notification system in place were able to do so quickly, notifying all top managers at once via phone, email, SMS and more, and connecting these decision makers using a conference call bridge that everyone could join with a touch of their keypad. This helped them share information, make urgent decisions and coordinate response efforts.This disaster reminded us all that, when it comes to business continuity, it's important to plan for the worst. It also highlighted the fact that old systems and old ways of doing things just don't work in this type of extreme situation. When this kind of interruption happens, consumers start clamoring for information and solutions; expectations are higher than ever before. It's important to get ahead of consumer reaction quickly, as call centers will quickly be swamped with calls for information. With a plan in place it's possible to use a bad situation to build goodwill and trust with customers (Mishra, 2014).

The situation in Japan reminded a lot of people that bad things can happen, and that an event can have a huge impact, even on those that are highly prepared. Sadly, many companies stop right there, realizing that they don't have a plan, and paralyzed about where to go from there. The survivors over the long term are those who have

considered the what-ifs and have put solid plans in place for dealing with interruption. Wise companies will initiate the use of SCM technology and a notification solution. Any company that doesn't use technology as part of SCM is at a distinct disadvantage, no matter how good their business continuity plans (Mishra, 2014).

According to supply chain experts, there are four major areas where SCM technology with notification will help. Those areas are global trade, supply relationship management, reverse logistics, and supply chain execution (Mangan & Lalwani (2016). On other related areas, Global trade is fraught with constantly changing regulations. A well-respected company recently received an exceedingly heavy fine for inadvertently side-stepping regulations and shipping night-vision goggles that eventually landed in the hands of terrorists (Thapa, (2014). According to Tate, (2013), automated notification, as part of SCM technology, could have kept everyone along the chain appraised of the latest updates and helped to avoid such a situation. Supply relationship management in 2007, Mattel had to recall over 10 million toys because lead paint was detected Tate, (2013). To stop the spread of tainted toys, the company had to work backwards along the chain to find out where the lead came from, and also forward to where the final goods were all shipped to affect a recall. With notification as part of an SCM toolkit, much of this communication could be automated, thus speeding the process and providing a reliable audit trail

Reverse logistics is the process of managing the return of goods, recycling of batteries and other components, disposal of products coming off lease, and the auctioning of those items, etc. When there is a sudden influx of new goods, manufacturers have to offload outdated goods quickly. Notification can help alert a variety of recyclers and other parties at once, allowing them to respond with times they are available to remove redistributed goods (Mishra, (2014). Supply chain execution is where one large discount retailer uses notification to make the delivery cycle more efficient. When a delivery arrives, staff has already been notified to be on standby to receive it immediately. If staff is not available, it's easy to alert truck to deliver to an alternate store and to reroute staff, saving both time and money (Thapa, (2014). As business complexity and global competition increases and consumer loyalty becomes more tenuous, more and more companies are exploring SCM technology to gain operational

efficiencies (Mishra, 2014). Using technology complemented with a reliable notification solution, they can establish a foundation for consistent leadership and secure a strong competitive edge.

2.5.2 Supply chain Management Practices

Effective and efficient supply chain management has now become a very valuable and important way to remain competitive in the market and to improve organizational performance. According to (Childhouse & Towill, 2003) supply chain management plays a very important role in enabling an organization to stay ahead of other competitors. Globalization has largely transformed the supply chain management practices among organizations due to its ability to deliver a product or service at a right place and at the right time. Organizations are realizing that to be competitive in global and local markets they need to develop efficient and effective supply chain management systems. The organizations have to understand the concepts and the practices of SC management for the intention of achieving competitiveness and increasing organizational profitability.

Supply chain management practices (SCM) are referred as the complete set of actions which are done in organizations towards improving the effectiveness of their supply chain. The modern evaluation of the SCM practices comprises of partnership with the supplier, process of outsourcing, compression of cycle time, continuousness of process flow and sharing or technology and information Monczka, *et. al*., (2015), (Tan, Kannan, & Handfield, 1998). Purchasing of quality products and relations with the customer for the purpose of representing SCM practices is very significant in modern organizations (Alvarado & Kotzab, 2001). In supply chain management, it is important to networking systems such as Electronic Data Interchange (EDI) and also ensures elimination of excessive inventory along the supply chain (Tan, Lyman, & wisner, 2002). Tan *et. al.,* (2002) identify six aspects of SCM practice through factor analysis: supply chain integration, information sharing, supply chain characteristics, customer service management, geographical proximity and JIT capability.

Chen & Paulraj (2004) use supplier base reduction, long-term relationship, communication, cross-functional teams and supplier involvement to measure both

customer and supplier relationship management. Min & Mentzer (2004) identify the concept of SCM as including agreed vision and goals, information sharing, risk and award sharing, cooperation, process integration, long-term relationship and agreed supply chain leadership. Thus the literature portrays SCM practices from a variety of different perspectives with a common goal of ultimately improving organizational performance.

According to an argument perpetuated by Monczka *et. al*., (2015) supply chain management practices can be divided into five different categories. The first and most important among these categories involves relationship management at both suppliers and customer levels. The level of information sharing along the supply chain is also very critical for any organization; quality of information sharing and postponement. These five dimensions are very essential in measuring SCM practice. The five constructs cover upstream (strategic supplier partnership) and downstream (customer relationship) sides of a supply chain, information flow across a supply chain (level of information sharing and quality of information sharing), and internal supply chain process (postponement). It should be pointed out that even though the above dimensions capture the major aspects of SCM practice, they cannot be considered complete. Other factors, such as geographical proximity, JIT/lean capability Tan *et. al*., (2002), cross-functional teams, logistics integration, agreed vision and goals, and agreed supply chain leadership are also identified. Supplier relation management may take a strategic perspective if it takes the form of the long-term relationship between the organization and its suppliers. It is designed to leverage the strategic and operational capabilities of individual participating organizations to help them achieve significant ongoing benefits.

A strategic partnership emphasizes direct, long-term association and encourages mutual planning and problem solving efforts Balsemier & Voicin (2016). The reason why organizations enter into strategic partnerships with suppliers is to promote shared benefits among the parties and ongoing participation in one or more key strategic areas such as technology, products, and markets. Strategic partnerships with suppliers enable organizations to work more effectively with a few important suppliers who are willing to share responsibility for the success of the products.

If suppliers are involved in the early stages of product design and development, they have the potential of offering more cost-effective design choices, help select the best components and technologies, and help in design assessment. When strategically aligned organizations can work closely together and eliminate wasteful time and effort. An effective supplier partnership can be a critical component of a leading edge supply chain (Noble, 1997). Mentzer *et. al.,* (2000) assert that when an organization puts in place measures to manage customer complaints, build long-term relationships with customers, and improve the satisfaction customers get from using the products of the organization, it is practicing customer relationship management.

They further consider customer relationship management as an important component among the various SCM practices. Organizations need to have committed relationships with their customers because of their inherent barriers to competition. The growth of mass customization and personalized service is leading to an era in which relationship management with customers is becoming crucial for corporate survival. Good relationships with supply chain members, including customers, are needed for successful implementation of SCM programs. The major gains that an organization can gain from good customer relationship management are the differentiation of its product from competitors, sustained loyalty of the customers to its products, and dramatic extension of the value it provides to its customers. Level of information sharing: Information sharing has two aspects: quantity and quality (Tan *et. al.,*2002).

The level of information sharing in a supply chain basically shows that the extent to which critical information is communicated to one's supply chain partner. Shared information can vary from strategic to tactical in nature and from information about logistics activities to general market and customer information. By taking the data available and sharing it with other parties within the supply chain, information can be used as a source of competitive advantage. Sharing of information is one of five building blocks that characterize a solid supply chain relationship. Supply chain partners who exchange information regularly are able to work as a single entity. An organization and its suppliers when they have strategic partnership can easily understand the needs of the end customer better and hence can respond to market

change quicker (Mentzer *et. al.,* 2000). Effective use of relevant and timely information by all functional elements within the supply chain is a key competitive and distinguishing factor. The empirical findings of Childhouse & Towill (2003) reveal that simplified material flow, including streamlining and making highly visible all information flow throughout the chain, is the key to an integrated and effective supply chain Quality of information sharing includes such aspects as the accuracy, timeliness, adequacy, and credibility of information exchanged. While information sharing is important, the significance of its impact on SCM depends on what information is shared, when and how it is shared, and with whom.

Literature is replete with example of the dysfunctional effects of inaccurate/delayed information, as information moves along the supply chain (McAdam & McCormack (2003). Divergent interests and opportunistic behavior of supply chain partners, and informational asymmetries across supply chain affect the quality of information. It has been suggested that organizations will deliberately distort information that can potentially reach not only their competitors, but also their own suppliers and customers. It appears that there is a built in reluctance within organizations to give away more than minimal information since information disclosure is perceived as a loss of power. Given these predispositions, ensuring the quality of the shared information becomes a critical aspect of effective SCM. Organizations need to view their information as a strategic asset and ensure that it flows with minimum delay and distortion. Postponement is also among the supply chain management practices.

It is the practice of moving forward one or more operations or activities such as making, sourcing and delivering to a much later point in the supply chain. Two primary considerations in developing a postponement strategy are: determining how many steps to postpone, and determining which steps to postpone. Postponement allows an organization to be flexible in developing different versions of the product in order to meet changing customer needs, and to differentiate a product or to modify a demand function (Waller & Dabholkar, 2000). Keeping materials undifferentiated for as long as possible will increase an organization’s flexibility in responding to changes in customer demand. In addition, an organization can reduce supply chain cost by keeping undifferentiated inventories. Postponement needs to match the type of

products, market demands of a company, and structure or constraints within the manufacturing and logistics system. Postponement can only be done under specific conditions such as when dealing with innovative products; when dealing with products that have high monetary density; if the organization has high specialization and wide range of products; markets characterized by long delivery time; low delivery frequency and high demand uncertainty; and manufacturing or logistics systems with small economies of scales and no need for special knowledge (Waller and Dabholkar, 2000).

2.5.3 Inventory Control

Inventory control is the processes employed to maximize a company's use of inventory. The goal of inventory control is to generate the maximum profit from the least amount of inventory investment without intruding upon customer satisfaction level, Islam *et. al.,* (2013). Given the impact on customers and profits, inventory control is one of the chief concerns of businesses that have large inventory investments, such as retailers and distributors. Raw materials availability- there must be enough raw materials inventory on hand to ensure that new jobs are launched in the production process in a timely manner, but not so much that the company is investing in an inordinate amount of inventory. The key control designed to address this balance is ordering frequently in small lot sizes from suppliers (Kaudunde, 2013). Few suppliers are willing to do this, given the cost of frequent deliveries, so a company may have to engage in sole sourcing of goods in order to entice suppliers into engaging in just-in-time deliveries. Finished goods availability a company may be able to charge a higher price for its products if it can reliably ship them to customers at once. Thus, there may be a pricing premium associated with having high levels of finished goods on hand (Ballou, 2007). However, the cost of investing in so many inventories may exceed the profits to be gained from doing so, so inventory control involves balancing the proportion of allowable backorders with a reduced level of on-hand finished goods. This may also lead to the use of a just-in-time manufacturing system, which only produces goods to specific customer orders (which nearly eliminates inventory levels).

Work in process- It is possible to reduce the amount of inventory that is being worked on in the production process, which further reduces the inventory investment. This can involve a broad array of actions, such as using production cells to work on subassemblies, shifting the work area into a smaller space to reduce the amount of inventory travel time, reducing machine setup times to switch to new jobs, and minimizing job sizes (Bonney & Jaber, 2013).

Reorder point. A key part of inventory control is deciding upon the best inventory level at which to reorder additional inventory. If the reorder level is set very low, this keeps the investment in inventory low, but also increases the risk of a stock out, which may interfere with the production process or sales to customers (Minner, 2003). The reverse problems arise if the reorder point is set too high. There can be a considerable amount of ongoing adjustment to reorder levels to fine tune these issues. An alternative method is to use a material requirements planning system to order only enough inventory for expected production levels. Bottleneck enhancement there is nearly always a bottleneck somewhere in the production process that interferes with the ability of the entire operation to increase its output. Inventory control can involve placing an inventory buffer immediately in front of the bottleneck operation, so that the bottleneck can keep running even if there are production failures upstream from it that would otherwise interfere with any inputs that it requires. Outsourcing Inventory control can also involve decisions to outsource some activities to suppliers, thereby shifting the inventory control burden to the suppliers (though usually in exchange for a reduced level of profitability.

Successful supply chain management is inventories and inventory control Wisner*, et. al.,* (2014). So how do food and agribusiness companies manage their inventories? What factors drive inventory costs? When might it make sense to keep larger inventories? Why were food companies quicker to pursue inventory reduction strategies than agribusiness firms? In 1992, some food manufacturers and grocers formed Efficient Consumer Response to shift their focus from controlling logistical costs to examining supply chains (King & Phumpiu, 1996).

Customer service also became a key competitive differentiation point for companies focused on value creation for end consumers. In such an environment, firms hold inventory for two main reasons, to reduce costs and to improve customer service. The motivation for each differs as firms balance the problem of having too much inventory (which can lead to high costs) versus having too little inventory (which can lead to lost sales).A common perception and experience is that supply chain management leads to cost savings, largely through reductions in inventory. Inventory costs have fallen by about 60% since 1982, while transportation costs have fallen by 20% (Wilson, 2004). Such cost savings have led many to pursue inventory-reduction strategies in the supply chain. To develop the most effective logistical strategy, a firm must understand the nature of product demand, inventory costs, and supply chain capabilities. Firms use one of three general approaches to manage inventory. First, most retailers use an inventory control approach, monitoring inventory levels by item. Second, manufacturers are typically more concerned with production scheduling and use flow management to manage inventories. Third, a number of firms (for the most part those processing raw materials or in extractive industries) do not actively manage inventory.

Many agribusiness firms do not actively manage inventory. This does not mean that they ignore inventory. Rather, they hold large inventories because any potential savings from inventory reductions are far outweighed by the inventory-induced reductions in production, procurement, or transportation costs. Often economies of size cause long productions runs which lead to inventory accumulation. Simultaneously, seasonality leads to inventory buildups of key inputs like seed as well as outputs like corn (Dooley, 2005). Economies in procurement such as forward buying in the food industry and quantity discounts increase inventories. Similarly, unit trains and other forms of bulk shipping discounts contribute to inventory buildups. Yet, such firms must be alert to changing conditions that may require more exact inventory management. One example would be if crops are marketed as small lots of value-added grain instead of commodities. Production proliferation in the seed industry may be another instance (Dooley, 2005).

2.5.4 Environmental Policies

The U.S. Environmental Protection Agency (EPA) and state environmental agencies regulate the impact of businesses on the environment. The EPA develops and enforces regulations that implement environmental laws enacted by Congress. Likewise, states agencies enforce regulations that implement laws enacted by the state legislature. There are dozens of environmental policies that apply to small businesses (Layzer, 2015). The EPA and other agencies help small businesses understand their specific requirements by publishing plain-language guides that explain actions business owners must take to comply with federal regulations (Nash *et. al.*, 2017). Similarly, most state governments provide similar guidance for laws enforced by state environmental agencies. This guide provides a collection of resources available from the federal government that help businesses understand their responsibilities under the nation's environmental laws (McNabb, 2017).

Some environmental laws require you to obtain an environmental permit before you can emit or discharge a pollutant into the air or water, dispose of hazardous waste, or engage in certain regulated activities. Permits are also used by federal, state and local government agencies to implement environmental laws intended to protect specific types of resources such as wetlands or endangered species). Most environmental permits are issued by state governments (Robinson, 2017). For years the producers' responsibilities were finished when the product was on the shelves in the shop or when the guarantee period was over. Supply chain (SC) management was perceived as the planning and control of the flow of goods from the sourcing base to the final consumers, accompanied with the necessary information and money for the independent entities along that chain Ivanov, D. et al (2016). Traditional supply chain management focuses on low cost, high quality, reduced lead time and high service level. The introduction of the Extended Producer Responsibility in a number of countries and industries has changed the rules of the market behaviours (Christopher, 2016).

Nowadays manufacturers need to take into consideration the post-consumption phase of their products, the so called end-of-life phase (EOL): the environmental burdens incurred during different stages of the product transfer from manufacturer to final user

and then to the disposal site Chari, N. (2015). The interest in environmentally friendly supply chain management has risen considerably in recent years. This can be seen by the number of initiatives taken by companies. Brand-owners are very often perceived to be responsible for environmental problems in the entire supply chain from to the sourcing base to end-of-life recovery issues (Schenkel, e*t. el.,* (2015). It is expected that the manufacturers should reduce sources of waste and pollution throughout their entire SCs, across multiple entities, upstream (suppliers) and downstream (distributors and consumers). An environmentally friendly supply chain connects with partners who should make managerial decisions with regard to environmental consequences. It enhances competitiveness and creates better customer service, resilience and increased profitability (Christopher, 2016).

Companies are forced to adopt ecologically responsive practices to meet legislative requirements but they can also benefit from "green" behaviour Kanchan, U., (Kumar, & Gupta, (2015). For example, building the technological and organizational capacity to collect, recycle and reuse waste or returns stream can enhance the availability of materials as well as clear up the supply channels. According to Srivastava, (2007) green SCM can reduce the ecological impact of industrial activity without sacrificing quality, cost, reliability, performance or energy utilization efficiency, meeting environmental policies to not only minimize ecological damage but also to ensure overall economic profit. Environmentally friendly behaviour can also contribute to the competitive advantage of having a green image of products, processes, and technologies.

2.5.5 Sustainable Supply Chain Management

2.5.5.1 Lead Time

According to Weirsema, (2001) lead time is the period of time between the initial phase of a process and the emergence of results, between the planning and completed manufacture of a product. Lead time is the latency (delay) between the initiation and execution of a process. In industry, lead time reduction is an important part of lean manufacturing. A more conventional definition of lead time in the supply chain management realm is the time from the moment the customer places an order (the moment you learn of the requirement) to the moment it is ready for delivery.

In the absence of finished goods or intermediate (work in progress) inventory, it is the time it takes to actually manufacture the order without any inventory other than raw materials. Wieland & Wallenburg, (2011) say that in the manufacturing environment, lead time has the same definition as that of Supply Chain Management, but it includes the time required to ship the parts from the supplier. The shipping time is included because the manufacturing company needs to know when the parts will be available for material requirements planning. It is also possible for lead time to include the time it takes for a company to process and have the part ready for manufacturing once it has been received (Black and Porter, 2006).

With tight International Journal of Academic Research in Business and Social Sciences April (2015), manufacturing constraints or when a company is using Just in Time manufacturing it is important for supply chain to know how long their own internal processes take. Identification of when supplier relationships are appropriate, the dimensions of effective relationships and how relationships can be a source of competitive advantage have received considerable attention in the literature. A supplier relationship is a relationship that differs with different suppliers. The goal of Supplier Relationship Management (SRM) is to streamline and make the processes between an enterprise and its suppliers more effective.

2.5.5.2 Cost

Wilemon, (2006) asserts that cost is the value of money that has been used up to produce something, and hence is not available for use anymore. In business, cost is one of acquisition, in which case the amount of money expended to acquire it, is counted as cost. In this case, money is the input that is gone in order to acquire the thing. This acquisition cost may be the sum of the cost of production as incurred by the original producer, and further costs of transaction as incurred by the acquirer over and above the price paid to the producer. Usually, the price also includes a mark-up for profit over the cost of production.

Ping, (2003) in recent years, there has been an increasing realization of the need for industrial buyers of goods and services to develop and maintain long-term relationships with their suppliers. This is especially true against the background that

long-term relationships can have a number of beneficial effects such as cost reduction and improved efficiency. Benefits may be a consequence of reduced transaction cost, improvement in the level of information flow, as well as improvements in product quality and performance. Establishing and improving buyer-seller relationships is therefore critical for industrial business partners in seeking out long-term sustainability in highly competitive industries. In order to be successful, channel partners need to develop, maintain and seek improvements on the dynamics of a relationship within the supply chain. One important factor that has been considered in many exchange relationships is cost, which is the financial value that is given out in exchange for a product. The marketing concept states that to achieve success an organization should identify and satisfy consumer needs and wants more effectively than competitors. Furthermore the extant literature in marketing holds that consumer satisfaction is the main directive of marketing.

This notion of consumer satisfaction is also connected to the concept of relationship marketing and the creation of long-term relationships which result in customer satisfaction, incorporating satisfaction relating to price and its various dimensions, (Varki & Colgate, 2001). In recent years, countless management experts and analysts have touted the benefits that businesses of all sizes can realize by establishing "partnerships" with their suppliers. Under such a plan, which is also sometimes referred to as "supply chain management," distribution channels are set up across organizations so that all the members of the channel, from suppliers to end users, coordinate their business activities and processes to minimize their total costs and maximize their effectiveness in the marketplace, (Hines, 2004). Common impediments to establishing true business partnerships with suppliers include: attachment of greater importance to other initiatives; comfortable relationships with existing suppliers; dearth of International Journal of Academic Research in Business and Social Sciences April 2015, cross-business unit cooperation; doubts about the benefits of instituting such practices; lack of cross-functional cooperation; poor monitoring and control systems; inexperience at managing improvement programs; and distrust of suppliers. Companies that feature many of these characteristics typically cling to old competitive bidding practices that center on perfectly legitimate concerns about price, but at the exclusion of all else, (Hines, 2004).

CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

The chapter describes and explains the research methodology of the study. The chapter thus, outlines into research design, target population and sample, description of research instrument, data collection procedure and data analysis technique.

3.2 Research Design

The research design that was adopted in this research study is the descriptive survey design. Descriptive survey is a method of collecting information by interviewing or administering a questionnaire to a sample of individuals (Orodho, 2003). It can be used when collecting information about people's attitudes, opinions, habits or any of the variety of education or social issues (Orodho and Kombo, 2002). The design adopted was an investigative design since it is easy and efficient to use and is an accurate counter and indicator to measure (Pamela, 2003). The researcher chose this research design because the study aimed at collecting information from respondents on their experiences and perceptions on factors affecting sustainable supply chain management in Kenyan tea manufacturing industries

3.3 Population of the Study

A population is the total collection of elements about which the researcher made some inferences (Okiro & Ndungu, 2013). The study was carried out at Iriani tea manufacturing factory in Nyeri South Sub County. The study targeted 120 management level employees in all cadres in the whole factory who are unit managers, production managers; factory accountants, field service coordinators, production assistants and assistant factory accountants. The population was categorized into departments as shown below.

Table 3.1 Target Population

Department	Target Population	Percentage (%)
Factory unit managers	40	33 %
Factory accoutants	35	29.3 %
Field service coordinators	15	12.5 %
Production assistants	30	25.2 %
Total	120	100

Source; Human Resource Section (2017)

3.4 Sample Size and Sampling Design

According to Cooper and Schindler (2008), a sampling design is the procedure by which a particular sample is drawn from a population. According to Mugenda and Mugenda (2003), a study should take as big sample to ensure that someone else would get similar findings to a high degree if he selected another sample of the same size. The reason for sampling is to select some of the elements in a population and draw conclusions about the entire population. 120 respondents were used hence the researcher used a census. Census is a complete enumeration of all items in the population. The study used purposive sampling technique to select respondents as it is determined by the decision of the researcher as to who would provide the best information to achieve the objectives of the study.

3.5 Data Collection Instrument

A questionnaire was used to collect primary data from the respondents. This tool was appropriate since responses were gathered in a standardized way (Harris & Brown, 2010). The questionnaire also enabled faster collection of large data within a limited time frame. The questionnaire was divided into three sections. The first section aimed to collect the respondent's general information. The findings in this section act as part of the independent variables that affect sustainable supply chain in tea manufacturing factories in Kenya. The second section, also presented questions on the independent variables. The third section of the questionnaire aimed to gather information about the dependent variable. The questionnaire were structured into closed ended questions and open ended questions. The closed ended questions were in the form of a five point Likert scale.

3.6 Pilot Study

3.6.1 Reliability Test

The piloting was critical in identifying the reliability and validity of the test items. Validity refers to the extent to which an instrument measures what is supposed to measure. Cook and Beckman (2006), stated that a pilot test helps to test the reliability and validity of data collection instruments. For data to be true and accurate, it has to be reliable. If a measurement is valid, it is also reliable. A pilot study was carried out on 10 people who were part of the population but were not included in the sample. This was to avoid respondent pollution.

3.6.2 Validity Test

Validity is the degree to which results obtained from the analysis of the data represent. The study used content validity as a measure of the degree to which data collected using a particular instrument represents a specific content of a particular concept. Streiner *et al* (2015), states that reliability refers to the consistency of measurement and is frequently assessed using the split-half test reliability method. A coefficient of 0.70 or more implies that there is a high degree of data reliability.

3.7 Data Analysis Presentation

According to Cooper and Schindler (2008), data analysis involves editing and reducing accumulated data to a manageable size, developing summaries and seeking for patterns using statistical methods. The data collected was first coded and entered into Statistical Package for Social Sciences (SPSS version 23) for analysis. The data was checked for completeness, consistence and reliability before analysis. The data was presented through percentages, means, standard deviation and frequencies.

The analysis was both descriptive and inferential. The descriptive analysis involved frequencies and percentages. Regression analysis was conducted to determine the relationship between the dependent variable and the independent variables. Statistical significance level was used to infer deductions from the study to the entire population. Findings were presented using tables and charts.

The regression coefficients indicate the relative importance of each of the independent variables in the prediction of the dependent variable.

The study used multiple regression model to analyses regression coefficient.

$Y=\alpha+\beta_1X_1+ \beta_2X_2+ \beta_3X_3+ \beta_4X_4+\varepsilon$

Y= sustainable supply chain management

α= Constant or autonomous factor

X_1 = Technology and Innovation

X_2 = Supply chain management practices

X_3 = Inventory control

X_4= Environment Regulation

ε = error term

β = coefficient of the factor

Autonomous factor is not affected by any other factor. Error term is the standard error accepted or the significance level to test relationship of the variables.

3.8 Ethical Considerations

While conducting the study, the researcher observed ethical issues. This was achieved by the research seeking for approval and authority to carry out research from the Dedan Kimathi University of Technology before embarking on the research. During the designing of the questionnaires care was taken not to ask offensive or sensitive personal information from the respondents. The researcher made prior arrangements and booked appointments with the respondents to avoid inconveniencing them. The researcher explained to the respondents the nature and purpose of the research and that no financial benefits would be received by the respondents for participation in the study. The researcher assured the respondents anonymity that information given would be treated with a lot of professionalism, confidentiality and for the purpose of the study only. The researcher sought the respondent's approval to participate in the study before issuing the questionnaires and gave them the option to withdraw from the study at any point during the study.

CHAPTER FOUR
RESEARCH FINDINGS AND DISCUSSIONS

4.1 Introduction

This chapter presents the research findings and discussion of the study guided by the four specific objectives; to determine the effects of technology change on sustainable supply chain management, to examine the effect of supply chain operational practices in sustainable supply chain management, to analyze the effect of inventory control practices on sustainable supply chain management and to identify the effects of environmental policies on sustainable supply chain management in Iriani tea factory in Nyeri South Sub County. The analysis was guided by the specific objectives and research questions of the study as highlighted in chapter one which were conceptualized in chapter two. Data interpretation was done in line with the research objectives and research questions. The techniques proposed in chapter three for data analysis and presentations were used to do the analysis and presentation.

4.2 Response Rate

The study targeted 120 respondents who are the employees of Iriani tea factory in Nyeri South Sub County. Out of the 120 questionnaires that were issued112 were dully filled and returned to the researcher for analysis. This gave a response rate of 93.3%. This response rate is within Mugenda and Mugenda (2003) who stipulated that a response rate of 70% and above is excellent.

Table 4.1: Results for Response Rate

Category	**Isued questionnaires**	**Returned questionnaires**	**Return rate**
Factory unit managers	40	38	95.0%
Factory accoutants	35	32	91.4%
Field service coordinators	15	14	93.3%
Production assistants	30	28	93.3%
Total	**120**	**112**	**93.3%**

4.3 Pilot Study Results

A pilot survey was conducted in order to ascertain the reliability of the data collection instrument using Cronbach's alpha coefficient (α) threshold of 0.7 coefficient. The findings in Table 4.2 shows that all the Cronbach Alpha (α) coefficients are above 0.7, these indicates that the research instrument was reliable and hence was relied on in this study.

Table 4.2 Reliability Test Results

Scale	Cronbachs alpha
Factory unit managers	.701
Factory accountants	.853
Field service coordinators	.810
Production assistants	.794

4.4 Demographic information

The preliminary information gathered regarding the characteristics of the respondents was about; gender, work experience level of education of the respondents.

4.4.1 Response by Gender

The study sought to establish the gender composition of the respondents working in Iriani tea factory in Nyeri South Sub County. The results are as presented in Figure 4.1. shows that 66.1% were male while 33.9% were female. This was an indication that males dominated the employees in Iriani tea factory but the factory was found to provide relatively equal employment opportunities for both males and females.

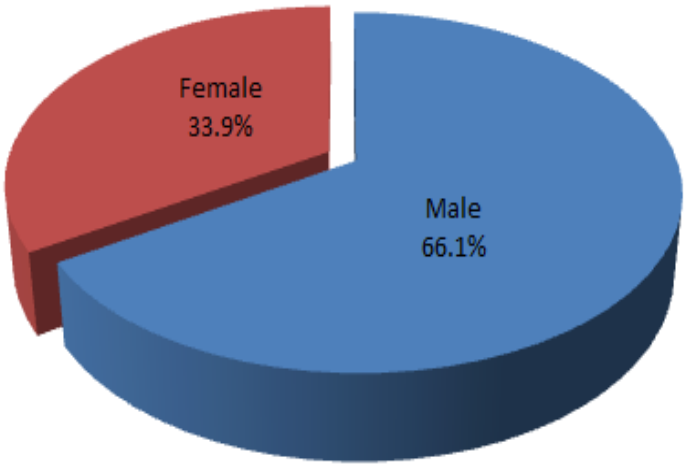

Figure 4.1: Gender of the Respondents

4.4.2 Working Experience

The study sought to determine working experience of the respondents under the study. From the findings in Figure 4.2 below, it presents that most of the respondents (68.7%) had a working experience of more than 4 years. It is worth noting that a minority of the respondents (30.3%) had a working experience of less than 3 years. This is an indication that the majority of the respondent could clearly identify the factors affecting sustainable supply chain management in Iriani tea factory.

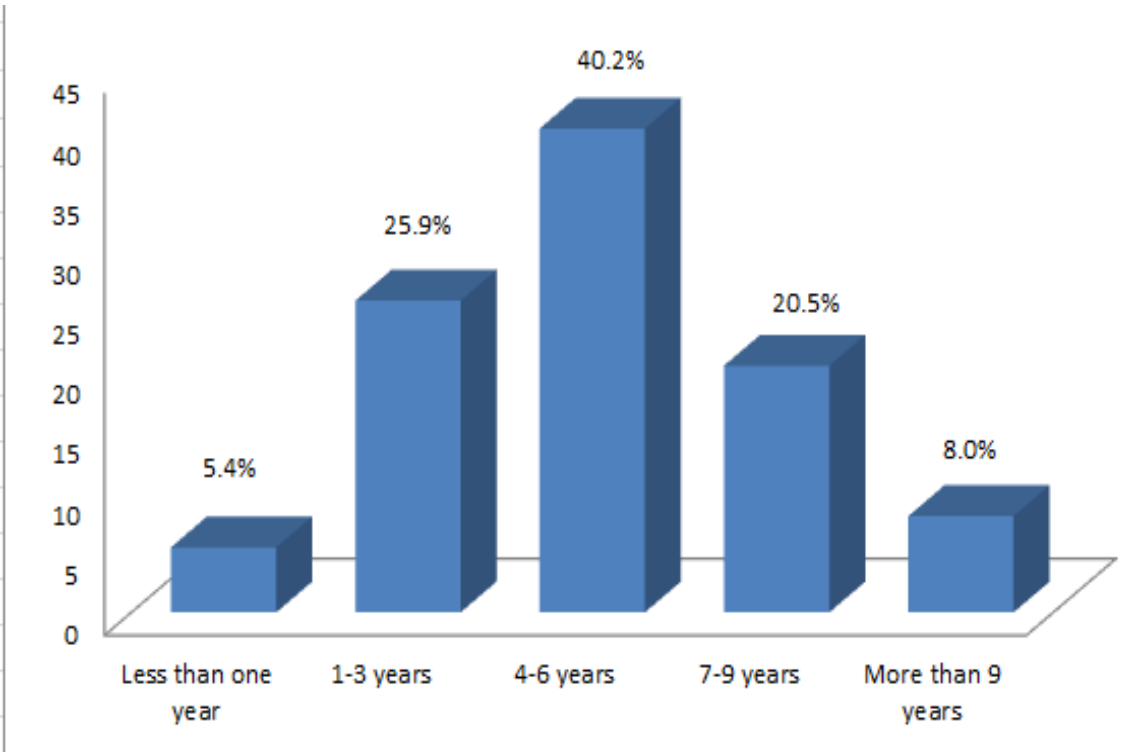

Figure 4.2: Working Experience of the Respondents

4.4.3 Level of Education

The study sought to establish the level of education of the respondents. As shown in Figure 4.3 below, 29.5% of the respondents had academic certificate, 55.4% were diploma holders, 11.6% were degree holders while 3.6% were master degree holders. This indicates the respondents had an understanding on sustainable supply chain management in Kenyan tea processing factory.

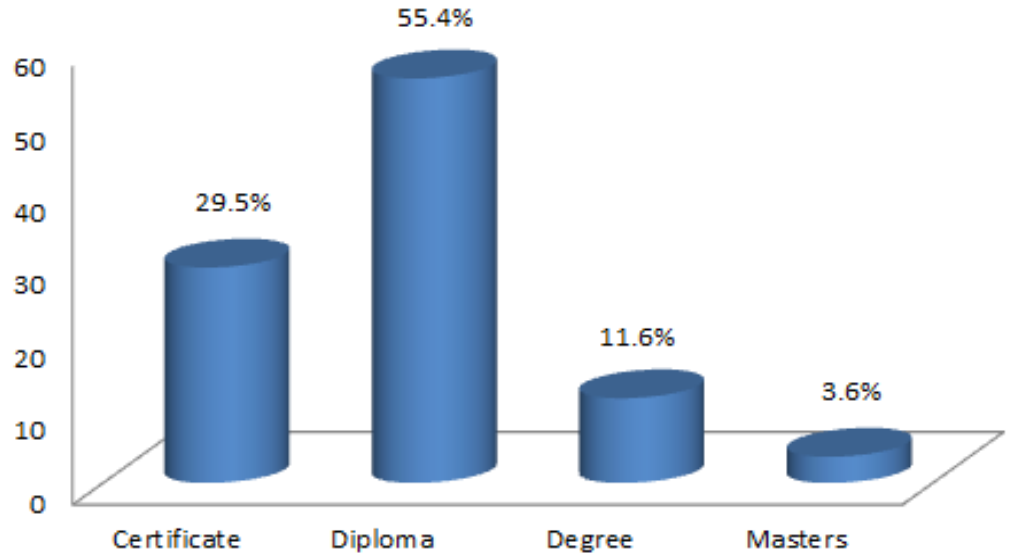

Figure 4.3: Level of Education of the Respondents

4.5 Technology Change and Sustainable Supply Chain Management

Objective one of the study sought to determine the effects of technology change on sustainable supply chain management in Iriani tea factory in Nyeri South Sub County. Descriptive statistic and bivariate linear regression analysis were done to determine the effect of technology change on sustainable supply chain management in Kenyan tea processing factory. The results of the descriptive statistics were shown in Table 4.3 below

Table 4.3: Descriptive Statistics of Technology Change

	N	Mean	Std. Error	Std. Dev
There is impact of technology on SSCM	112	4.3393	.09622	1.01833
There is reduced cost of systems maintenance.	112	4.0268	.06884	.72857
There is no system delays	112	3.7054	.09629	1.01908
Valid N (listwise)	112			

As shown in Table 4.3, the impact of technology on SSCM was rated highest with a mean score of 4.339 (SD=1.018) followed by the reduced cost of systems maintenance with a mean score 4.027 (SD=0.729). The study also revealed a number of respondents indicated that there is no system delays with a mean score of 3.705 (SD= 1.019). From the findings of the study, it was evident that technology plays a major role on sustainable supply chain management in Iriani tea factory and has led to

reduced cost of systems maintenance. According to Thapa, (2014) in his book, adoption of new technology in supply chain management, technology was found to one of the factors that enhance sustainable supply chain management. The was inline with Xiang, *et. al.*, (2015), who noted that as the internet, email and other technologies have become ubiquitous, the expectations of consumers have grown correspondingly. Mishra, (2014), opined that the roles and responsibilities within companies have expanded and become more specific hence the need to embrace new technology. In his book, Mishra stated that the new technologies skills have become more specific, and companies are much less likely to want to pull people from important jobs to focus their attention on supply chain problems.

4.5.1 Use Technological Systems in the Factory

The study sought to establish how often factory do use technological systems. As shown in figure 4.4, majority of the respondents (81.3%) said that they always use technology, 10.7% said that they sometimes use technology while 8.0% said that they rarely use technology. The indication is that most of the employees working in Iriaini factory use technology in their day to day activities.

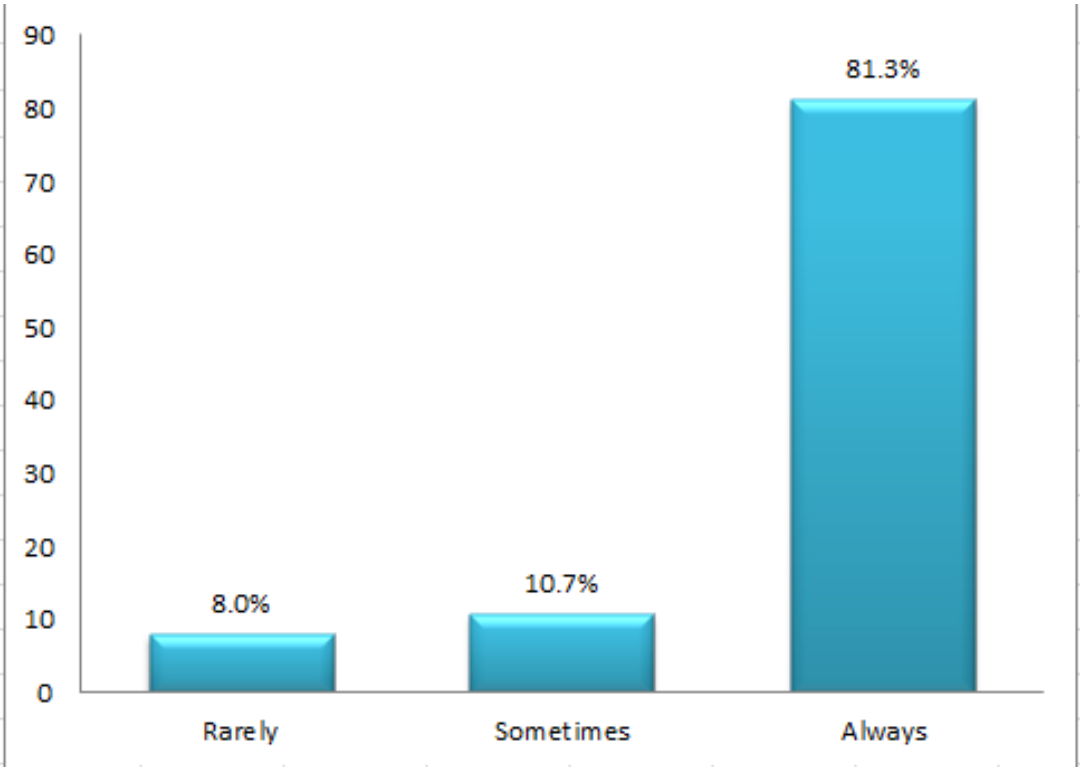

Figure 4.5: Use technological systems in the factory

4.5.3 Frequency of Staff Training on the Use of Technology

The study sought to establish how often the staffs are trained on the use of technology. Figure 4.5 revealed that majority of the staff indicated that they are trained annually, 8.0% indicated monthly while 3.6% indicated training is done weekly. This could be attributed to the skills required and the target group within the factory

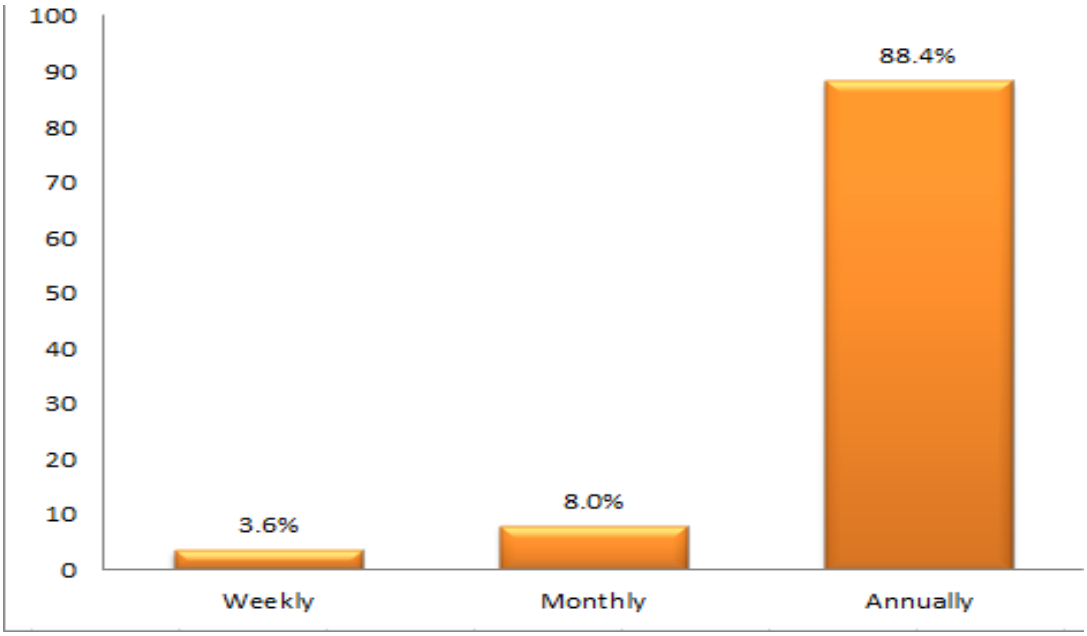

Figure 4.6: Frequency of staff training on the use of technology

4.5.4 Influence of Technology Change on Sustainable Supply Chain Management

The bivariate linear regression analysis was conducted to establish the relationship between Technology change and sustainable supply chain management. The results of the findings were as shown in Table 4.4 to 4.6

Table 4.4: Model Summary for Technology Change

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.266[a]	.071	.062	1.15520

a. Predictors: (Constant), Technology Change

Table 4.4 showed the values of R and R^2 for the model fitted of 0.266 and 0.071 respectively. The R value of 0.266 portrayed a positive linear relationship between the technology change and sustainable supply chain management in Kenyan tea factories.

The R^2 value of 0.071 implied that 7.1% of the variation in sustainable supply chain management in Kenyan tea factories was explained by the model $Y= \beta 0 + \beta_1 X_1$.

Table 4.5: ANOVA for Technology Change

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	11.198	1	11.198	8.391	.005[b]
	Residual	146.793	110	1.334		
	Total	157.991	111			

a. Dependent Variable: Sustainable Supply Chain Management

b. Predictors: (Constant), Technology change

An ANOVA was carried out which as from Table 4.5 showed the F statistic p value of 0.005. Since the p value of the F- statistic was less than 0.05, it implied that considering the simple regression model fitted above technology change had significant effect on sustainable supply chain management in Kenyan tea factories.

Table 4.6: Coefficients for Technology Change

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.685	.299		8.988	.000
	Technology Change	.245	.084	.266	2.897	.005

a. Dependent Variable: Sustainable Supply Chain Management

The results of coefficients to the model $Y= 2.685 + 0.245X_1$ indicates that technology change is statistically significant at the 0.05 level of significance as shown on Table 4.6. This was because the p value of 0.005 was less than 0.05. The constant term implied that at zero consideration of technology change, sustainable supply chain management in Kenyan tea factories would be at 2.685, increasing the technology change would increase the sustainable supply chain management by 0.245. the finding support earlier finding by Thapa, (2014), who found out that technology has crept into SCM step by step, beginning with electronic invoicing, computerized shipping and tracking and automated notifications that were advanced by companies like FedEx and UPS. According to Ross (2016), modern supply chain managers understand that technology provides increased visibility and accountability; therefore, a stronger

competitive edge and tight control of supply the chain is worth the investment. According to Tate, (2013), automated notification, as part of SCM technology, could have kept everyone along the chain appraised

4.6 Supply Chain Management Practices and Sustainable Supply Chain Management

Objective two of the study sought to examine the effect of supply chain operational practices in sustainable supply chain management in Iriani tea factory in Nyeri South Sub County. Descriptive statistic and bivariate linear regression analysis were done to determine the effect of supply chain operational practices on sustainable supply chain management in Kenyan tea processing factory. The results of the descriptive statistics were shown in Table 4.7 below

Table 4.7: Descriptive Statistics of Supply Chain Management Practices

	N	Mean	Std. Error	Std. Dev
There is suppliers partnership	112	4.2321	.06340	.67092
There is timely elimination of excess waste	112	3.9286	.12602	1.33366
Outsourcing is done appropriately	112	3.9286	.12666	1.34039
There is purchasing of quality product	112	3.3214	.12760	1.35044
Valid N (listwise)	112			

As shown in Table 4.7, the presence of suppliers partnership was rated highest with a mean score of 4.232 (SD=0.671) followed by timely elimination of excess waste with a mean score 3.929 (SD=1.334). Outsourcing being done appropriately had a mean score of 3.929(SD=1.340) while purchasing of quality product had a mean score of 3.321(SD=1.350). The study therefore indicates that the factories had partnered with suppliers and there has been a timely elimination of waste with a view to enhance supply chain management practices. According to Childhouse & Towill, (2003), organizations are realizing that to be competitive in global and local markets they need to develop efficient and effective supply chain management systems. They concluded that organizations have to understand the concepts and the practices of SC management for the intention of achieving competitiveness and increasing organizational profitability. Tan, Lyman, & wisner (2002), opined that in supply chain management, it is important to networking systems such as Electronic Data

Interchange (EDI) and also ensures elimination of excessive inventory along the supply chain. According to Balsemier & Voicin (2016), the reason why organizations enter into strategic partnerships with suppliers is to promote shared benefits among the parties and ongoing participation in one or more key strategic areas such as technology, products, and markets. Strategic partnerships with suppliers enable organizations to work more effectively with a few important suppliers who are willing to share responsibility for the success of the products.

4.6.1 Effect of Outsourcing on SSCM

The study sought to establish the effect of out sourcing on SSCM of the factory. The study revealed that slightly above half of the respondents indicated that out sourcing affect SSCM of the Kenyan tea factory.

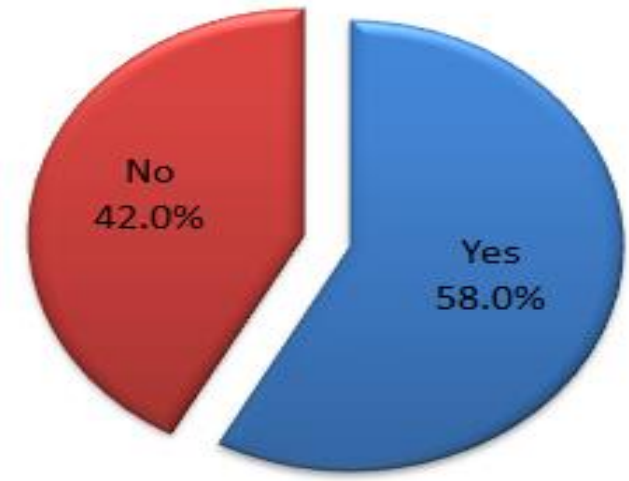

Figure 4.7: Effect of out sourcing on SSCM

4.6.2 Influence of Supply Chain Management Practices on Sustainable Supply Chain Management

The bivariate linear regression analysis was conducted to establish the relationship between supply chain operational practices and sustainable supply chain management. The results of the findings were as shown in Table 4.8 to 4.10

Table 4.8: Model Summary for Supply Chain Management Practices

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.373[a]	.139	.131	1.11208

a. Predictors: (Constant), Supply Chain Management Practices

Table 4.8 showed the values of R and R^2 for the model fitted of 0.373 and 0.139 respectively. The R value of 0.373 portrayed a positive linear relationship between the supply chain operational practices and sustainable supply chain management in Kenyan tea factories. The R^2 value of 0.139 implied that 13.9% of the variation in sustainable supply chain management in Kenyan tea factories was explained by the model $Y= \beta 0 + \beta_2 X_2$.

Table 4.9: ANOVA for Supply Chain Management Practices

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	21.953	1	21.953	17.751	.000[b]
	Residual	136.038	110	1.237		
	Total	157.991	111			

a. Dependent Variable: Sustainable Supply Chain Management

b. Predictors: (Constant), Supply Chain Management Practices

An ANOVA was carried out which as from Table 4.9 showed the F statistic p value of 0.000. Since the p value of the F- statistic was less than 0.05, it implied that considering the simple regression model fitted above supply chain operational practices had significant effect on sustainable supply chain management in Kenyan tea factories.

Table 4.10: Coefficients for Supply Chain Management Practices

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.087	.349		5.974	.000
	Supply Chain Management Practices	.377	.089	.373	4.213	.000

a. Dependent Variable: Sustainable Supply Chain Management

The results of coefficients to the model $Y= 2.087 + 0.377X_2$ indicates that supply chain operational practices is statistically significant at the 0.05 level of significance as shown on Table 4.10. This was because the p value of 0.000 was less than 0.05. The constant term implied that at zero consideration of supply chain operational practices, sustainable supply chain management in Kenyan tea factories would be at 2.087, increasing the supply chain operational practices would increase the sustainable supply chain management by 0.377. The finding of the study concurs with Childhouse & Towill, (2003) who noted that supply chain management plays a very important role in enabling an organization to stay ahead of other competitors. They further noted that globalization has largely transformed the supply chain management practices among organizations due to its ability to deliver a product or service at a right place and at the right time.

4.7 Inventory Control Practices and Sustainable Supply Chain Management

Objective three of the study sought to analyze the effect of inventory control practices on sustainable supply chain management in Iriani tea factory in Nyeri South Sub County. Descriptive statistic and bivariate linear regression analysis were done to determine the effect of inventory control practices on sustainable supply chain management in Kenyan tea processing factory. The results of the descriptive statistics were shown in Table 4.11 below

Table 4.11: Descriptive Statistics of Inventory Control Practices

	N	Mean	Std. Error	Std. Dev
The organization enjoys economies of scale	112	4.2321	.06340	.67092
There is no frequent deliveries	112	3.9286	.07255	.76775
There is delayed dispatch of ordered products	112	2.7321	.10983	1.16234
Just in time manufacturing system is not implemented	112	1.3036	.04886	.51708
Valid N (listwise)	112			

As shown in Table 4.11, the organization enjoys economies of scale was rated highest with a mean score of 4.232 (SD=0.671) followed by the finding that there is

no frequent deliveries with a mean score 3.929(SD=0.768). The study also revealed the presence of delayed dispatch of ordered products had a mean score 2.732 (SD=01.162) while just in time manufacturing system not being implemented had a mean score 1.304 (SD=0.517). The study revealed that the factory enjoys economies of scale however since presence of delayed dispatch of ordered products and lack of implementation of just in time manufacturing system were lowly rated was an indication that dispatches were not delayed and there has been aspect of implementation of just in time manufacturing system. The finding supports Gao (2017), who noted that the fact that technology with notification has influenced the SCM scene is evident by the increasing trend towards just-in-time inventory management. He concluded that JIT is a great way to free up cash and increase working capital by letting inventory run down

4.7.1 Effect of Warehouse in the Factory

The study sought to establish whether keeping a warehouse improves sustainability in the factory. As shown in figure 4.8, slightly above half (59.8%) indicated that keeping a warehouse improves sustainability in the factory.

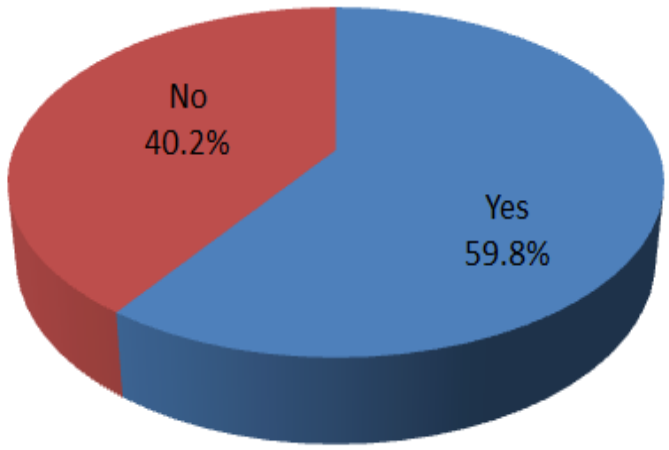

Figure 4.8: Effect of warehouse in the factory

4.7.2 Influence of Inventory Control Practices on Sustainable Supply Chain Management

The bivariate linear regression analysis was conducted to establish the relationship between Inventory Control practices and sustainable supply chain management. The results of the findings were as shown in Table 4.12 to 4.14

Table 4.12: Model Summary for Inventory Control practices

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.121[a]	.015	.006	1.18966

a. Predictors: (Constant), Inventory Control practices

Table 4.12 showed the values of R and R^2 for the model fitted of 0.121 and 0.015 respectively. The R value of 0.015 portrayed a weak positive linear relationship between the inventory control practices and sustainable supply chain management in Kenyan tea factories. The R^2 value of 0.015 implied that 1.5% of the variation in sustainable supply chain management in Kenyan tea factories was explained by the model $Y= \beta 0 + \beta_3 X_3$.

Table 4.13: ANOVA for Inventory Control Practices

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2.308	1	2.308	1.631	.204[b]
	Residual	155.683	110	1.415		
	Total	157.991	111			

a. Dependent Variable: Sustainable Supply Chain Management

b. Predictors: (Constant), Inventory Control

An ANOVA was carried out which as from Table 4.13 showed the F statistic p value of 0.204. Since the p value of the F- statistic was greater than 0.05, it implied that considering the simple regression model fitted above inventory control practices had insignificant effect on sustainable supply chain management in Kenyan tea factories.

Table 4.14: Coefficients for Inventory Control Practices

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.203	.252		12.691	.000
	Inventory Control	.126	.099	.121	1.277	.204

a. Dependent Variable: Sustainable Supply Chain Management

The results of coefficients to the model $Y= 3.203 + 0.126X_3$ indicates that inventory control practices had statistically insignificant at the 0.05 level of significance as shown on Table 4.14. This was because the p value of 0.204 was less than 0.05. The constant term implied that at zero consideration of inventory control practices, sustainable supply chain management in Kenyan tea factories would be at 3.203, increasing the inventory control practices would increase the sustainable supply chain management by 0.126. Islam *et. al.*, (2013), stated that inventory control is the processes employed to maximize a company's use of inventory. The goal of inventory control is to generate the maximum profit from the least amount of inventory investment without intruding upon customer satisfaction level. This can only be achieved by ensuring that there is enough raw materials inventory on hand to ensure that new jobs are launched in the production process in a timely manner, but not so much that the company is investing in an inordinate amount of inventory. However in tea factories the availability of raw materials depends on tea production which is affected by so many factors some beyond the factories control such as weather and tea husbandry.

4.8 Environmental Policies and Sustainable Supply Chain Management

Objective four of the study sought to identify the effects of environmental policies on sustainable supply chain management in Iriani tea factory in Nyeri South Sub County. Descriptive statistic and bivariate linear regression analysis were done to determine the effect of environmental policies on sustainable supply chain management in Kenyan tea processing factory. The results of the descriptive statistics were shown in Table 4.15 below

Table 4.15: Descriptive Statistics of Environmental Policies

	N	Mean	Std. Error	Std. Dev
Waste disposal	112	4.2232	.06431	.68062
Cost of waste management	112	3.5089	.06082	.64369
Packaging and end- of- life products	112	3.2589	.08946	.94674
The organization Complies to environmental policies	112	2.7679	.06828	.72263
Valid N (listwise)	112			

From Table 4.3, the results of the study indicated that impact of waste disposal on environment was rated highest with a mean score of 4.223 (SD=0.681) followed by the cost of waste management with a mean score 3.509 (SD=0.644). Packaging and end- of- life products had a mean score of 3.259 (SD=0.947) while Compliance to environmental policies had a mean score of 2.768 (SD=0.723). It is evident from the study that the cost of waste management is a major environmental factor that affects sustainable supply chain management in Kenyan tea processing factory. Mishra (2014), stated that reverse logistics is the process of managing the return of goods, recycling of batteries and other components, disposal of products coming off lease, and the auctioning of those items, etc. When there is a sudden influx of new goods, manufacturers have to offload outdated goods quickly. Notification can help alert a variety of recyclers and other parties at once, allowing them to respond with times they are available to remove redistributed goods

4.8.1 Mechanisms to Minimize Environmental Pollutions

The study sought to establish whether the factory has mechanisms to minimize environmental pollutions. As shown in figure 4.9, the respondents were indifferent on whether what the factory had put in place could effectively minimize environmental pollutions which accounted to 49.1 and 50.9 respectively.

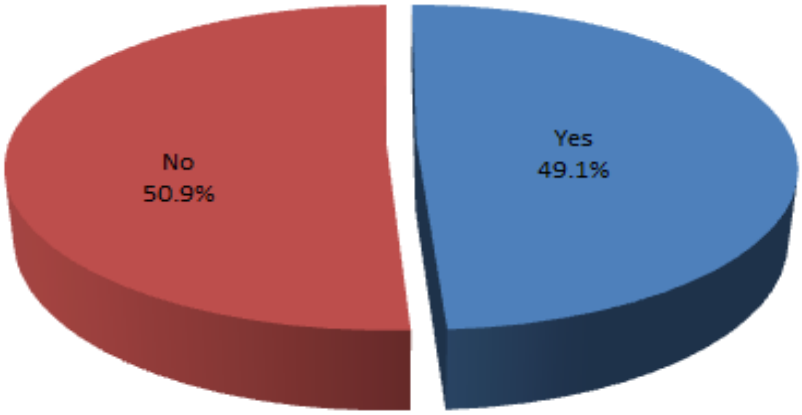

Figure 4.9: presence of Mechanisms to minimize environmental pollutions

4.8.2 Influence of Environmental Policies on Sustainable Supply Chain Management

The bivariate linear regression analysis was conducted to establish the relationship between environmental policies and sustainable supply chain management. The results of the findings were as shown in Table 4.16 to 4.18

Table 4.16: Model Summary for Environmental Policies

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.148[a]	.022	.013	1.18530

a. Predictors: (Constant), Environmental Policies

Table 4.16 showed the values of R and R^2 for the model fitted of 0.148 and 0.022 respectively. The R value of 0.148 portrayed a weak positive linear relationship between the environmental policies and sustainable supply chain management in Kenyan tea factories. The R^2 value of 0.071 implied that 2.2% of the variation in sustainable supply chain management in Kenyan tea factories was explained by the model $Y= \beta 0 + \beta_4 X_4$.

Table 4.17: ANOVA for Environmental Policies

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.449	1	3.449	2.455	.120[b]
	Residual	154.542	110	1.405		
	Total	157.991	111			

a. Dependent Variable: Sustainable Supply Chain Management

b. Predictors: (Constant), Environmental Policies

An ANOVA was carried out which as from Table 4.17 showed the F statistic p value of 0.120. Since the p value of the F- statistic was greater than 0.05, it implied that considering the simple regression model fitted above environmental policies had insignificant effect on sustainable supply chain management in Kenyan tea factories.

Table 4.18: Coefficients for Environmental Policies

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.755	.483		5.700	.000
	Environmental Policies	.187	.119	.148	1.567	.120

a. Dependent Variable: Sustainable Supply Chain Management

The results of coefficients to the model $Y= 2.755 + 0.187X_4$ indicates that environmental policies is statistically insignificant at the 0.05 level of significance as shown on Table 4.18. This was because the p value of 0.120 which was greater than 0.05. The constant term implied that at zero consideration of environmental policies, sustainable supply chain management in Kenyan tea factories would be at 2.755, increasing the environmental policies would increase the sustainable supply chain management by 0.187. Robinson (2017), noted that some environmental laws require factories to obtain an environmental permit before they can emit or discharge a pollutant into the air or water, dispose of hazardous waste, or engage in certain regulated activities. Permits are also used by national and local government agencies to implement environmental laws intended to protect specific types of resources such as wetlands or endangered species. The requirements to obtain environmental permits

issued by state governments may have hindered effective mechanism to minimize environmental pollutants.

4.9 Sustainable Supply Chain Management

Carter and Rogers (2008), define sustainable supply chain management as the strategic, transparent integration and achievement of an organization's social, environmental and economic goals in the systematic coordination of key organizational business processes for improving the long-term economic performance of the individual and its supply chain. The finding of various sustainable supply chain management factors considered under that study as in Table 4.19

Table 4.19: Descriptive Statistics of Sustainable Supply Chain Management

	N	Mean	Std. Error	Std. Dev
There cross functional cooperation and team work	112	4.2232	.06176	.65361
Customer are satisfied	112	3.9643	.10530	1.11443
There is good suppliers relationship	112	3.4732	.15271	1.61613
There is adequate monitoring and control systems	112	3.2143	.15965	1.68955
Valid N (listwise)	112			

As shown in Table 4.11, the presence of cross functional cooperation and team work was rated highest with a mean score of 4.223 (SD=0.654) followed by the finding that customer satisfaction with a mean score 3.964(SD=1.114). The study also revealed the there is good suppliers relationship and adequate monitoring and control systems with mean score 3.473 and 3.214 respectively.

4.10 Overall Multiple Regression Model

The researcher carried out multiple regression analysis between the independent and dependent variables of the study. In order to conduct multiple regression analysis the set of items that measured each independent variable were aggregated by computing the average. Multiple linear regression analysis was then used to test whether there existed interdependency between independent variables (technology change, supply chain management practices, inventory control and environmental policies) and

dependent variable (sustainable supply chain management). The findings of the multiple regression analysis for each of the four independent variables are discussed in Table 4.20 to Table 4.22.

Table 4.20: Model Summary for Factors affecting sustainable supply chain management

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.467[a]	.218	.189	1.07433

a. Predictors: (Constant), Environmental Policies, Inventory Control, Technology and Innovation, Supply Chain Management Practices

Table 4.22 showed the values of R and R^2 for the model fitted of 0.467 and 0.218 respectively. The R value of 0.467 portrayed a positive linear relationship between technology change, supply chain management practices, inventory control, and environmental policies and sustainable supply chain management in Iriani tea factory. The R^2 value of 0.218 implied that 21.8% of the sustainable supply chain management was explained by the model $Y= \beta 0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + e$

Table 4.21: ANOVA for Factors affecting sustainable supply chain management

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	34.494	4	8.624	7.472	.000[b]
	Residual	123.497	107	1.154		
	Total	157.991	111			

a. Dependent Variable: Sustainable Supply Chain Management

b. Predictors: (Constant), Environmental Policies, Inventory Control, Technology and Innovation, Supply Chain Management Practices

An ANOVA was carried out which as from Table 4.23 showed the F statistic p value of 0.000. Since the p value of the F- statistic was less than 0.05, it implied that considering the multiple regression model fitted above technology change, supply chain management practices, inventory control, and environmental policies had significant effect on sustainable supply chain management in Kenyan tea factories.

Table 4.22: Coefficients for Factors affecting sustainable supply chain management

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.506	.652		.776	.440
Technology and Innovation	.307	.098	.294	3.149	.002
Supply Chain Management Practices	.390	.109	.386	3.564	.001
Inventory Control	.075	.094	.081	.796	.428
Environmental Policies	.148	.118	.117	1.261	.210

a. Dependent Variable: Sustainable Supply Chain Management

The results of coefficients indicated that technology change and supply chain had positive and statistically significant effect on sustainable supply chain management in Kenyan tea factories with $\beta_1 = 0.307$ at p value 0.002 and $\beta_2 = 0.390$ at p value 0.001 which are less than 0.05. Inventory control and environmental policies had positive and statistically insignificant effect on sustainable supply chain management in Kenyan tea factories with and $\beta_3 = 0.075$ at p value 0.428 and $\beta_4 = 0.148$ at p value 0.210 which is greater than 0.05. The optimal regression model for this study can be stated as: $Y= 0.506+ 0.390X_1 + 0.307X_2 + e$. where Y= sustainable supply chain management, X_1 is supply chain management practices index and X_2 is technology change index. Inventory control (X_3) and environmental policies (X_4) were eliminated from the optimal model since their effect on sustainable supply chain management in Kenyan tea factories is not significant.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary of the research work undertaken, discusses the research findings, the conclusions that were drawn, recommendations made, knowledge gained and the suggested areas of further research based on the analyzed data related to the general and specific objectives of the study.

5.2 Summary of the Finding

This section presents a summary of the main findings of the study based on the four core objectives that the researcher sought to accomplish. The general objective of the study was to assess the factors affecting sustainable supply chain management in Kenyan tea processing factory with particular focus on Iriani tea factory in Nyeri South Sub County. The study specifically sought to examine the effect of technology change, supply chain management practices, inventory control, and environmental policies in sustainable supply chain management in Iriani tea factory in Nyeri South Sub County.

5.2.1 Technology Change

The first objective of the study was to determine the effects of technology change on sustainable supply chain management in Iriani tea factory in Nyeri South Sub County. Descriptive results revealed that majority of the respondents indicated that there is impact of technology on SSCM and reduced cost of systems maintenance after technology change. In addition, system delays reduced hence ensuring smooth running of the day-to-day operations. The study further revealed that technological systems are always used in the factory and the staff training is normally conducted annually. The bivariate regression results indicated that technology change had a positive and statistically significant effect on sustainable supply chain management in Kenyan tea factories at the 0.05 level of significance. Multiple regression further revealed that technology change had a positive and statistically significant effect.

5.2.2 Supply Chain Operational Practices

The second objective of the study was to examine the effect of supply chain operational practices in sustainable supply chain management in Iriani tea factory in Nyeri South Sub County. Descriptive results revealed that majority of the respondents indicated that there is suppliers partnership and timely elimination of excess waste. In addition, outsourcing was found to be done appropriately and there is consideration of quality when purchasing products. The bivariate regression results indicated that supply chain operational practices had a positive and statistically significant effect on sustainable supply chain management in Kenyan tea factories at the 0.05 level of significance. Multiple regression further revealed that supply chain operational practices had a positive and statistically significant effect.

5.2.3 Inventory Control Practices

The third objective of the study was to analyze the effect of inventory control practices on sustainable supply chain management in Iriani tea factory in Nyeri South Sub County. Descriptive results revealed that majority of the respondents indicated that the organization enjoys economies of scale. The study further revealed that respondents rated presence of delayed dispatch of ordered products and lack of implementation of just in time manufacturing system lowly which is an indication that dispatches were not delayed and there has been aspect of implementation of just in time manufacturing system. The bivariate regression results indicated that inventory control practices had a positive but statistically insignificant effect on sustainable supply chain management in Kenyan tea factories at the 0.05 level of significance. Multiple regression further revealed that inventory control practices had a positive but statistically insignificant effect.

5.2.4 Environmental Policies

The fourth objective of the study was to identify the effects of environmental policies on sustainable supply chain management in Iriani tea factory in Nyeri South Sub County. Descriptive results revealed that majority of the respondents indicated that waste disposal and cost of waste management had high impact on sustainable supply chain management. In addition, compliance to environmental policies was rated low due to lack of effective mechanisms to minimize environmental pollutions. The

bivariate regression results indicated that environmental policies had a positive but statistically insignificant effect on sustainable supply chain management in Kenyan tea factories at the 0.05 level of significance. Multiple regression further revealed that environmental policies had a positive but statistically insignificant effect.

5.3 Conclusions of the Study

The studies revealed that majority of the respondents had worked with Iriani tea factory for more than four years. This indicates that respondents can articulate issues relating to factors affecting sustainable supply chain management in Kenyan tea processing factory. The results of study revealed that technology change had a positive and statistically significant effect on sustainable supply chain management in Kenyan tea processing factory. Therefore the study concludes that tea processing factory should consider focusing on technological change with a view to ensure that most of the transactions are done using the computerized systems.

Supply chain operational practices had a positive and statistically significant effect on sustainable supply chain management in Kenyan tea factories. The study conclude that tea processing factory should adopt several supply chain operational practices such as suppliers partnership and purchases of quality products with the aim of eliminating excess waste.

Inventory control practices had a positive but statistically insignificant effect on sustainable supply chain management in Kenyan tea factories. This could be attributed by the fact that factories may not have direct control of what farmers produce and the tea production is dependent of proper tea husbandry, conducive weather condition among others where the factories are expected to process the production within their area of coverage.

Environmental policies had a positive but statistically insignificant effect on sustainable supply chain management in Kenyan tea factories. This could be attributed to the fact that tea factories had not managed to establish effective mechanisms to minimize environmental pollutions.

The study further revealed that there has been reduction of cost of the systems maintenance and system delays after technology change. In addition, there were no frequent deliveries but there was enjoyment of economies of scale.

5.4 Recommendations of the Study

Based on the study, a number of recommendations can be made to enhance sustainable supply chain management in Kenyan tea factories. To start with the study recommend that tea processing factory should consider focusing on technological change with a view to ensure that most of the transactions are done using the computerized systems. In addition, tea processing factory should adopt several supply chain operational practices such as suppliers partnership and purchases of quality products with the aim of eliminating excess waste. The managers should also focus of exploring appropriate mechanisms to minimize environmental pollutions in Kenyan tea processing factories. Moreover the tea processing factory should focus on implementation of just in time manufacturing system that will effectively enhance sustainable supply chain management in Kenyan tea factories

5.5 Areas for Further Research

The study confined itself to Iriaini tea factory, while there is need to undertake comparative studies covering all tea factories across the country in order to validate whether the findings can be generalized. Future researchers should also focus on challenges tea factories across the country face when they focus on sustainable supply chain management.

REFERENCES

Akkermans, H., Bogerd, P., & Vos, B. (1999). Virtuous and vicious cycles on the road towards international supply chain management. International Journal of Operations and Production Management.

Alexander, A. E. (2016). *Sustainable supply chain management and decision theory: a qualitative exploration using planetary boundaries and social foundations* (Doctoral dissertation, Cardiff University).

Altekar, R. V. (2005). Supply chain management: Concepts and cases. New Delhi: Prentice Hall.

Amemba, C. S. (2013). Green Supply Chain best Practices in Hospitality Industry in Kenya. Global Journal of Commerce and Management Perspective, 2(3), 7–18.

Amemba, C. S., Nyaboke, P. G., Osoro, A., & Mburu, N. (2013). Elements of Green Supply ChainManagement. European Journal of Business and Management, 5(12), 51–61.

Anbumozhi, V., & Kanda, Y. (2005). Greening the production and supply chains in Asia.

Asmuni, I. (2015). Peranan teknologi dalam supply chain managemen untuk mendukung kinerja perusahaan. *Prosiding Sembistek 2014*, *1*(02), 637-647.

Atlas, M., & Florida, R. (1998). Green manufacturing: Handbook of Technology Management.

Ballou, R. H. (2007). *Business logistics/supply chain management: planning, organizing, and controlling the supply chain*. Pearson Education India.

Birou, L. M., Fawcett, S. E., & Magnan, G. M. (1998). The product life cycle: A tool for functional strategic alignment.

Bonney, M., & Jaber, M. Y. (2013). Developing an input–output activity matrix (IOAM) for environmental and economic analysis of manufacturing systems and logistics chains. *International Journal of Production Economics*, *143*(2), 589-597.

Bowersox, D. J. (1990). The strategic benefits of logistics alliances: Harvard Business Review, 68(4), 36–43.

Bryman, A., & Cramer, D. (1996). Quantitative Data Analysis with Minitab: A guide for Social Scientists.United Kingdom: Amazon.

Burugo, V. M., & Owour, D. (2017). Influence Of Strategic Management Practices On Business Profitability In Kenya.(A Case Study of Chai Trading Company Limited). *Imperial Journal of Interdisciplinary Research*, *3*(4).

Cai, J., Liu, X., Xiao, Z., & Liu, J. (2009). Improving supply chain performance management: A systematicapproach to analyzing iterative KPI accomplishment. Decision Support Systems, 46, 512–521.http://dx.doi.org/10.1016/j.dss.2008.09.004

Carter, C. R., & Ellram, L. M. (1998). Reverse logistics: A review of the literature and framework for futureinvestigation. Journal of Business Logistics, 19(1), 85–102.

Chopra, S., & Meindl, P. (2010). Supply Chain Management: Strategy, Planning, and Operation (4th ed.).Boston, MA: Pearson Education.

Christopher, M. (1998). Logistics and Supply Chain Management: Strategies for Reducing Cost and Improving Service (2nd ed.). London: Prentice Hall.

Christopher, M. (2016). *Logistics & supply chain management*. Pearson UK.

Cox, A. et al (2003). Supply chain management: A guide to best practice. Great Britain: Pearson Education Limited.

Decrop, A. (1999). Triangulation in Qualitative Tourism Research: Tourism Management, 20(2), 157–161

Decrop, A. (2004). Trustworthiness in Qualitative tourism Research. In J. Phillimore & L. Goodson (Eds.), Ontologies, Epistemologies and Methodologies (pp. 156–167). London: Routledge.

Dooley, F. (2005). Logistics, inventory control, and supply chain management. *Choices*, *20*(4), 287-91.

Doyle, P. (1994). Marketing Management and Strategy. London: Prentice-Hall.

Edington, J. (2017). Indigenous Knowledge and the Course of Development. In *Indigenous Environmental Knowledge* (pp. 171-201). Springer, Cham.

Farley, G. A. (1997). Discovering Supply Chain management: A Roundtable Discussion. APICS—The performance Advantage, 7(1), 38–39.

Formentini, M., & Taticchi, P. (2016). Corporate sustainability approaches and governance mechanisms in sustainable supply chain management. *Journal of cleaner production*, *112*, 1920-1933.

Gao, X. (2017). Corporate cash hoarding: The role of just-in-time adoption.

Glover, D., & Kusterer, K. (2016). *Small farmers, big business: contract farming and rural development*. Springer.

Goh, M., & Pinaikul, P. (1998). Logistics management practices and development in Thailand. LogisticsInformation Management.

Gunasekaran, A., Patel, C., & McGaughey, R. E. (2004). A framework for supply chain performance measurement. International Journal of Production Economics, Journal of Management and Sustainability Vol. 4, No. 3; 2014.

Hakizimana, C., Goldsmith, P., Nunow, A. A., Roba, A. W., & Biashara, J. K. (2017). Land and agricultural commercialisation in Meru County, Kenya: evidence from three models. *The Journal of Peasant Studies*, *44*(3), 555-573.

Handfield, R. B., Sroufe, R., & Walton, S. V. (2005). Integrating environmental management and supply chainstrategies. Business Strategy and the Environment.

Handfield, R., & Nichols, E. (1999). Introduction to Supply Chain Management. Englewood Cliffs: PrenticeHall.

Hardy, C., & Philips, N. (1998). Strategies of Engagement: Lessons from the critical examination ofcollaboration and conflict in an Inter-organizational domain. Organization Science.

Hu, A. H. (2010). Critical factors for implementing green supply chain management practice. Management research review.

Kahn, K., & Mentzer, J. (1996). Logistics and interdepartmental integration. International Journal of PhysicalDistribution and Logistics Management.

Kanchan, U., Kumar, N., & Gupta, A. (2015). GREEN BUSINESS-Way to achieve globally sustainable competitive advantage. *Journal of Progressive Research in Social Sciences*, *2*(2), 92-100.

Kathure, D. O. R. E. E. N. (2014). Influence of non-financial rewards on employee commitment at Kenya tea development agency. *University of Nairobi*.

Kombo, D. K., & Tromp, D. L. (2011). Thesis and Thesis writing: An introduction. Nairobi: Pauline'spublications Africa.

Kothari, C. R. (2009). Research methodology: Methods and Techniques. India New Delhi: Willey Eastern Ltd.

Kumar, S., Khurana, I., & Sobhanbabu, P. R. K. (2014). Scoping Study: India's Global Resource Footprint in Food, Energy and Water (FEW).

Kwon, I., & Suh, T. (2004). Factors affecting the level of trust and commitment in supply chain relationships.Journal of Supply Chain Management, 40(2), 4–14.

Layzer, J. A. (2015). *The environmental case*. SAGE.

Lee, H. L., & Whang, S. (2001). E-Business and Supply Chain Integration. Stanford Global Supply Chain Management Forum, 223–241.

Lee, H. L., Padmanabhan, V., & Wang, S. (1997). The Bullwhip effect in Supply Chains. Sloan ManagementReview, 38(3), 93–102.

Li, S. H., Ragu-Nathan, B., Ragu-Nathan, T. S., & Rao, S. S. (2006). The Impact of Supply chain Management Practices on Competitive Advantage and Organizational Performance.

Lysons, K., & Farrington, B. (2012). Purchasing and Supply Chain Management (8th ed.). Pearson Harlow:CIPS Textbook.Matos, S., & Hall, J. (2007). Integrating sustainable development in the supply chain: The case of life cycle assessment in oil and gas and agricultural biotechnology. Journal of Operations Management.

Mangan, J., & Lalwani, C. (2016). *Global logistics and supply chain management*. John Wiley &

Mentzer, J. T. (2004). Fundamentals of Supply Chain Management: Twelve Drivers for Competitive Advantage.Thousand Oaks, CA: Sage Publications, Inc.Sons.

Minner, S. (2003). Multiple-supplier inventory models in supply chain management: A review. *International Journal of Production Economics*, *81*, 265-279.

Mishra, R. K. (2014). Role of Information Technology in supply chain management.

Moberg, C. R., Cutler, B. D., Gross, A., & Speh, T. W. (2002). Identifying antecedents of information exchange within supply chains. International Journal for Physical Distribution & Logistics, 32(9), 755

Mugenda, O. M., & Mugenda A.G. (2008). Research Methods: Quantitative and Qualitative Approaches.Nairobi: Acts press.

Nachmias, C., & Nachmias, D. (2008). Research Methods in Social Sciences (7th ed.). New York: WorthPublishers.Orodho, J., & Kombo, D. (2002). Research methods. Nairobi: Kenyatta University, Institute of Open learning.

Ngatia, C. W., & Chirchir, M. K. (2013). Supply chain management practices and performance of Kenya tea development agency managed factories.

Pagell, M. (2004). Understanding the factors that enable and inhibit the integration of operations, purchasing and logistics. Journal of Operations Management, 22(5), 459–487.

Patton, M. Q. (2002). Qualitative Research and Evaluation Methods. Thousand Oaks and London: Sage Publication.

Porter, M. E. (1985). Competitive advantage: creating and sustaining superior performance. New York: The Free Press.

Power, D. (2005). Supply chain management integration and implementation: A literature review. Supply ChainManagement, 10(3), 252–263. Journal of Management and Sustainability Vol. 4, No. 3; 2014

Premkumar, G., Ramamurthy, K., & Saunders, C. (2003). Information processing view of organizations: An exploratory examination of fit in the context of inter-organizational relationships. Journal of Management Information Systems, 22(1), 257–294.

Radjou, N., & Prabhu, J. (2015). *Frugal Innovation: How to do more with less*. The Economist.

Ring, P., & Van de Ven, A. (1992). Structuring Cooperative relationships between organizations: Strategic Management Journal, 13(7), 483–498.

Ross, D. F. (2016). *Introduction to supply chain management technologies*. CRC Press.

Salam, M. A. (2008, December 3–5). Green procurement adoption in manufacturing supply chain. Proceedingsof the 9th Asia Pasific Industrial Engineering & Management Systems.

Schlegel, G. L., & Trent, R. J. (2014). *Supply Chain Risk Management: An Emerging Discipline*. Crc Press.

Scott, C., & Westbrook, R. (1991). New strategic tools for supply chain management. International Journal of Physical Distribution & Logistics Management.

Shah, J. (2009). Supply Chain Management: Text and Cases. New Delhi, India: Pearson Education.

Sharma, M. K., & Bhagwat, R. (2006). Practice of information systems: Evidence from select Indian SMEs.Journal of Manufacturing Technology.

Simchi-Levi, D., Kaminsky, P., & Simchi-Levi, E. (2009). Designing and Managing the Supply Chain:Concepts, Strategies and Case Studies (3rd ed.). New York: McGraw-Hill.

Spekman, R. E., Kamauff, J. W., & Myhr, N. (1998). An empirical investigation into supply chain management:A perspective on partnerships. Supply Chain Management.

Stadtler, H., & Kilger, C. (2005). Supply Chain Management and Advanced Planning: Concepts, Models,Software and Case Studies.

Stank, T. P., Keller, S. B., & Daugherty, P. J. (2001). Supply Chain Collaboration and Logistical service performance. Journal of Business Logistics.

Stonebraker, P., & Liao, J. (2004). Environmental turbulence, strategic orientation: Modeling supply chain integration. International Journal of Operations & Production Management.

Tan, X. C., Liu, F., Cao, H. J., & Zhang, H. (2002). A decision making framework model of cutting fluid selection for green manufacturing and a case study. J. Mater. Process. Tech

Tate, W. (2013). *The Definitive Guide to Supply Management and Procurement: Principles and Strategies for Establishing Efficient, Effective, and Sustainable Supply Management Operations*. Pearson Education

Thapa, B. (2014). Adoption of new technology in supply chain management: a survey of nepalese oragnizations

Thomas, R. (2015). *Big Data Revolution: What Farmers, Doctors, and Insurance Agents Can Teach Us about Patterns in Big Data*. John Wiley & Sons.

Trochin, W. (2004). Research Methods Knowledge Base. Ithaca: Cornell University UNIDO (2006) Product quality: A guide for small and Medium-sized enterprises.

United Kingdom Cabinet Office. (1999). The Performance and Innovation Unit.

Van Hock, R., & Erasmus, I. (2000). From reversed logistics to green supply chains. Logistics Solutions.

Wamalwa, B. P. (2014). Sustainable Supply Chain Management as a Strategic Tool for Competitive Advantage in Tea Industry in Kenya. *Journal of Management and Sustainability*,

Yu, Z., Yan, H., & Cheng, T. (2001). Benefits of information sharing with supply chain partnerships. Industrial Management & Data Systems.

Zhu, Q., Sarkis, J., & Geng, Y. (2005). Green supply chain management in China: Pressures, Practices and performance. International Journal of Operations & Production Management

APPENDIX I: LETTER OF INTRODUCTION

John Kirima Mwenda

P. O. Box 500-10100,

Nyeri,

Tel: 0708803812.

Dear respondent,

RE: ACADEMIC RESEARCH

I am a student of Dedan Kimathi University of Technology (DeKUT), pursuing a Degree of Master of Science in Supply Chain Management. I am conducting an academic research to investigate the factors affecting sustainable supply chain management in Kenyan processing factory and specifically Iriaini Tea Factory, Nyeri South Sub-county.

You are requested to provide information relating to technology and innovation, supply chain management practices, inventory control and environmental policies as some of the factors that might have impact on sustainable supply chain management. All the information provided will be treated with strict confidence and in no circumstances will your name be quoted in the report. Kindly fill in the enclosed questionnaire to the best of your knowledge.

You are hereby assured that the information you give will be treated with utmost confidentiality and that it will be used for this study only. Kindly ensure that you do not write your name on the questionnaire.

Yours Faithfully,

John Kirima Mwenda

APPENDIX: QUESTIONNAIRE

SECTION A: General demographics information

Under which department do you work in at Iriani tea factory?.....

1. What is your gender? Male ☐ Female ☐

2. How long have you worked in Iriani tea factory?

Less than one year ☐

1-3 years ☐

4-6 years ☐

7-9 years ☐

More than 9 years ☐

3. What is your highest level of education?

Certificate ☐

Diploma ☐

Degree ☐

Masters ☐

Any other ……

SECTION B: Technology and Innovation

The following technological factors affect sustainable supply chain management in your factory? Tick (√) appropriately.

KEY: SD=Strongly Disagree D= Disagree N=Neutral A=Agree SA= Strongly Agree.

(1 represent strongly disagree up to strongly agree at 5)

Effects	**SD 1**	**D 2**	**N3**	**A4**	**SA5**
There is no system delays					
There is reduced cost of systems maitainance.					
There is impact of technology on SSCM					

How often do you comprehensively use technological systems in the industry?

a) Rarely

b) Sometimes

c) Always

How often do you train staff on the use of technology?

a. Weekly

b. Monthly

c. Annually

SECTION C: Supply Chain Management Practices

The following supply chain management practices affect sustainable supply chain management in your factory? Tick (√) appropriately.

KEY: SD=Strongly Disagree D= Disagree N=Neutral A=Agree SA= Strongly Agree.

(1 represent strongly disagree up to strongly agree at 5)

Effects	**SD1**	**D2**	**N3**	**A4**	**SA5**
There is suppliers partinership					
There is timely elimination of excess waste					
Outsourcing is done appropriately					
There is purchasing of quality product					

Does the process of out sourcing affect SSCM in your factory? Yes [ ] No [ ]

SECTION D: Inventory Control

The following inventory control factors affect sustainable supply chain management in your factory? Tick (√) appropriately

Effects	**SD1**	**D2**	**N3**	**A4**	**SA5**
The organization enjoys economies of scale					
There is delayed dispatch of ordered products					
There is no frequent deliveries					
Just in time manufacturing system is not implemented					

Do keeping a warehouse improves sustainability in you factory? Yes [ ] No [ ]

SECTION E: Environmental Policies

The following environmental factors affect sustainable supply chain management in your factory? Tick (√) appropriately.

KEY: SD=Strongly Disagree D= Disagree N=Neutral A=Agree SA= Strongly Agree.

(1 represent strongly disagree up to strongly agree at 5)

Effects	**SD1**	**D2**	**N3**	**A4**	**SA5**
The organization Complys to environmental policies					
Cost of waste management					
Waste disposal					
Packaging and end- of- life products					

Does your factory has mechanisms to minimize environmental pollutions?

SECTION F: Sustainable Supply Chain Management

The following factors affect sustainable supply chain management in your factory?

Tick (√) appropriately.

KEY: SD=Strongly Disagree D= Disagree N=Neutral A=Agree SA= Strongly Agree.

(1 represent strongly disagree up to strongly agree at 5)

Effects	**SD1**	**D2**	**N3**	**A4**	**SA5**
Customer are satisfied					
There is adequate monitoring and control systems					
There cross functional cooperations and team work					
There is good suppliers relationship					