

**REVERSE LOGISTICS PRACTICES AND VALUE
CHAIN PERFORMANCE IN THE FOOD AND
BEVERAGE INDUSTRY IN KENYA**

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**Reverse Logistics Practices and Value Chain Performance in the Food
and Beverage Industry in Kenya**

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DECLARATION

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

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DEDICATION

I would like to dedicate this thesis to my family for their continued support during its development. Through the hard times their encouragement gave me strength to go on.

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It is my humble pleasure to sincerely thank the Almighty God for helping me to successfully complete this thesis by giving me the gift of life, good health. I would also like to thank Dr. Jane Omwenga and Dr. Eric Namusonge for giving me the guidance throughout the thesis writing process and their continued support. I would also like to thank my family and friends for the financial and emotional support they gave me through this period.

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ACRONYMS AND ABBREVIATIONS

3PL	Third Party Logistics
ANOVA	Analysis of Variance
EOL	End of Life
EOU	End of Use
GDP	Gross Domestic Product
ICT	Information and Communication Technology
KAM	Kenya Association of Manufacturers
KMO	Kaiser-Meyer Olin Measure
KNBS	Kenya National Bureau of Statistics
LCA	Life Cycle Assessment
MRO	Maintenance, Repair and Operations
NEMA	National Environment Management Authority
PET	Polyethylene Terephthalate
RBV	Resource Based View
RL	Reverse Logistics
SMEs	Small and Medium Enterprises
SNT	Social Network Theory
SPSS	Statistical Package for Social Sciences
VCA	Value Chain Analysis
VIF	Variance Inflation Factor

WECD

World Commission on Environment and Development

DEFINITION OF OPERATIONAL TERMS

Customer Involvement refers to the active participation of customers in product return processes, feedback provision, and engagement in programs such as take-back, recycling, and repair initiatives. (Kumar, Singh, & Vaish, 2024). Consumer involvement refers to the degree to which consumers engage with a firm's processes, including providing feedback, participating in take-back schemes, and returning packaging or products to support reverse logistics operations (Khan, Waqas & Irfan, 2021).

Product Return is the process of a consumer taking previously purchased merchandise back to the manufacturer and in return receiving a refund in the original form of payment, exchange for another item or a store credit (Mostert, 2017). Product returns are goods sent back by customers or distributors due to reasons such as defects, dissatisfaction, end-of-life, or unsold stock, forming an essential component of reverse logistics (Panya & Marendi, 2021).

Recycling involves dismantling returned or end-of-life products to recover raw materials for reprocessing into new products or packaging. (Rubio, Jimenez-Parra, Chamorro-Mera & Miranda, 2019). Recycling is the process of recovering materials from used products and converting them into raw materials for reuse in new production cycles, thereby reducing waste and conserving resources (Rasool, Appiah, & Owusu-Bio, 2024).

Reusing is the process where unused or somewhat utilized items are acquired from the purchaser and infused back into the supply chain network without any further upgrade or processing (Rubio, Jiménez-Parra, Chamorro-Mera, & Miranda, 2019). Reuse refers to the practice of

using products or components again for the same or a different purpose with little or no processing, often through cleaning or minor refurbishment (Hazir, 2022).

Remanufacturing is the industrial process of disassembling, repairing, refurbishing, and reassembling returned products so that they perform like new and often come with equivalent warranties. (Govindan, Jha, & Agarwal, 2023). Remanufacturing is the process of disassembling, repairing, replacing, and reassembling used products to restore them to like-new condition, meeting original performance specifications (Torres & Gallego-Gómez, 2022).

Reverse logistics involves all activities in the reverse stream from the point of utilization to the point of origin in order to recapture value to add competitive advantage or suitable disposal at the End of Life (EoL) or End of Use (EoU) state. (Panya & Marendi, 2021). Reverse logistics is the flow of goods from the consumer back to the producer for purposes such as returns, recycling, remanufacturing, or safe disposal, aimed at capturing value and ensuring sustainability (DHL, 2023).

Value Chain is a set of activities performed by a firm to create value from delivery of a product or service to the market (Zucchi, 2023). A value chain comprises all activities and processes involved in designing, producing, distributing, and servicing a product, each stage adding value to the final output delivered to the customer (Kaplinsky & Morris, 2020).

Value Chain Performance involves managing an organizations' activities, resources and strategies of other organizations upon which it must rely in order to develop, produce and market goods and services. It refers to the

extent to which a value chain effectively and efficiently creates, delivers, and captures value while minimizing costs and maximizing customer satisfaction (Mwari, 2019)

ABSTRACT

Reverse logistics practices include all activities in the reverse flow from the point of utilization to the point of origin in order to recapture value to add competitive advantage or suitable disposal at the End of Life (EoL) or End of Use (EoU) capacity. Reverse logistics implementation in Kenya faces notable challenges, including infrastructural constraints, high costs of collection and reverse flows, lack of consumer participation, and limited awareness among small and medium enterprises. This research aimed at establishing the role of reverse logistics practices and value chain performance in the food and beverage industry in Kenya. Specifically, the study sought to establish the role of recycling practices, reusing practices, remanufacturing practices, product returns practices and the moderating effect of consumer involvement on value chain performance in the food and beverage industry. The research was based on the institutional theory, social network theory, resource based view theory and Michael Porter's value chain model and it was significant to researchers and academicians, supply chain officers and the government. The research used descriptive research design and the study covered 291 companies in the food and beverage industry and a sample size of 74 companies chosen using purposive sampling by the researcher for data collection. The instrument of primary data collection was questionnaires while the instruments of secondary data collection involved published journals and articles. The data was analyzed using qualitative and quantitative methods. The pilot study was conducted from 10% of the entire population. Data was coded in SPSS version 24 and analyzed using descriptive and inferential statistics. The study findings indicated that remanufacturing has the most significant influence on value chain performance in the food and beverage industry followed by recycling and product returns. The study also established that most of the organizations who manufacture packages that can be reused do so for reusing at the consumption point by the consumer but they do not mostly reverse the products for recycling at the organizational level. The study also found that most organizations had implemented isolated aspects of reverse logistics but others had not yet embraced the idea of reverse logistics in their value chains as an optimization technique. Therefore, the study concluded that the organizations that have considered reverse logistics in their value chains are improving performance of their value chains and reducing their operational costs in the process. The study recommended that food and beverage manufacturing companies should strive to maintain strong relationships with their suppliers and consumers in order to streamline their reverse logistics process and enhance the optimal performance of their value chains. The study recommended that the food and beverage industry regulators and the government should devise policies that would allow food and beverage manufacturers to integrate their value chains to help avoid losses that impact the efficiency of these businesses and eventually the economy as a whole. During the research it was noted that a majority of the existing studies focused on the adoption of reverse logistics practices rather than the implementation. This study will serve as a reference point for organizations which have implemented reverse logistics practices in their value chains. This research was based on reverse logistics practices and value chain performance of the food and beverage industry in Kenya and there is a need to undertake similar studies in retail or

commercial sector to uncover the underlying relationships and the findings may identify interesting comparisons.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Porter (1985) introduced the concept of the "value chain" to describe how a company's interconnected processes work together to deliver value to customers. The value chain model shows how a firm can generate more value by eliminating activities that don't contribute to value. Value is produced in the form of goods and services through various processes carried out by a network of organizations. These processes help create value for the end consumer by transforming raw materials into finished products. To create value that consumers see as worthwhile, companies must perform certain operations to produce goods and services perceived as valuable, thus improving the firm's competitive position. To enhance value chain performance, companies need to integrate internal functional activities and link them with the external processes of their suppliers and customers (Manzouri & Aghaie, 2019).

Chen (2025) discussed the concept of "industrial upgrading" to describe the dynamic shift of raw materials or goods from one stage of the value chain to another (Mwari, 2019). Initially, global value chain analysis centered mainly on economic and competitiveness factors, but more recently it has incorporated social and environmental dimensions such as labor regulations, green value chains, workforce development, gender equality, and disability inclusion, among other elements. In today's business world, there has been growing momentum around environmentally friendly and climate-conscious corporate practices due to escalating greenhouse gas emissions and environmental contamination by companies. This has accelerated the need for firms to realign their value chain operations with a focus on conserving scarce and limited resources.

Due to the unexpected surge in ecological movements, regulations and concerns over the past decade, there is growing consensus that environmental pollution issues associated with industrial growth need to be addressed in conjunction with value chain management, thus contributing to the reverse logistics movement (Korir, 2018). Organizations may opt

to implement reverse logistics for reasons like environmental regulations and policies, extended producer responsibility, economics, value-added customer service, financial strength, fierce competition, and consumer pressure (Maeke, 2017).

Reverse logistics involves all activities in the reverse flow from point of use back to point of origin in order to recapture value for competitive advantage or proper disposal at end-of-life (EoL) or end-of-use (EoU) capacity (Odhiambo, 2014). Practices include returning products to suppliers, reselling, salvaging, repairing, refurbishing, remanufacturing, reclaiming materials, repackaging, recycling, reusing, and landfill disposal (Adesoga, Olaiya, Onuma, Ajayi & Olagunju, 2024). Returns may result from supply chain partners balancing stock, marketing returns, obsolescence, end-of-season/life cycle returns, and transportation damage, or from consumers due to defects, unwanted products, mismatched descriptions, warranty returns, recalls, and disposal concerns (Tee, Spencer & Garratt, 2024).

Reverse logistics focuses on post-consumer waste containing recoverable value that companies can reintegrate into the value chain as a new asset (Mobolaji, 2017). The motivations for reverse logistics differ across enterprises and it is practiced in industries like printers, cameras, jet engines, phones, cars, laptops, steel, chemicals, pharmaceuticals, and refillable containers. Most companies doing reverse logistics share the goal of asset preservation through value recovery and waste reduction (Mobolaji, 2017). Reverse channel actors should provide value-adding activities to ensure technical and financial viability of the entire cycle (Ismatov, 2015). More than just reversing forward logistics, reverse logistics requires restructuring parts of the value chain, managing reverse storage and transport, establishing new businesses, and integrated administration of reverse and closed-loop networks for efficient and effective processes (Banomyong, Varadejsatitwong & Julagasigorn, 2020). Balancing economic, environmental, and value chain performance has become important for companies facing competitive, regulatory and societal pressures.

1.1.1 Global Perspective of Reverse Logistics

Traditionally, reverse logistics was designed within the product development lifecycle. More recently, it has been adopted as an environmental approach, since its processes are often triggered when something goes wrong, like post-sales failure, customer canceling a purchase, excess unsold stock, incorrect shipments, or product damage during use (de Campos, de Paula, Pagani & Guarnieri, 2017a). Reverse logistics originally evolved from the 1990s, starting with remanufacturing as a technical issue to a value-added process involving design, management, control, and many decentralized actors. Researchers then closed the loop, taking a systems design perspective across the full product lifecycle. More recently, consumer behavior and product valuation are recognized as relevant issues, raising questions like who will buy remanufactured products, can value be recovered from returns cost-effectively, and is there adequate access to used products? In developed countries, reverse logistics adoption is more established, while in developing countries it is still in its infancy (Bouzon, Spricigo, Rodriguez, de Queiroz, & Cauchick Miguel, 2015). In developing economies, barriers remain regarding technology, infrastructure, governance, processes, finances, knowledge, policies, markets, competitors, and management (Abdulrahman, Gunasekaran, & Subramanian, 2014). Other cited challenges include marketing recovered products, remanufacturing competition, cannibalization concerns, and consumer willingness to purchase remanufactured goods (Prakash & Barua, 2015).

The global reverse logistics market was valued at \$635.6 billion in 2022 and is projected to reach \$958.3 billion by 2028, reflecting a 5.6% compound annual growth rate (Mayank, Aditya & Sonia, 2021). Growth is expected from increased innovation and automated technologies. Government infrastructure funding also aids growth by enabling easier reverse logistics operations. Rising retail sales, new product launches, and regulations against selling dangerous goods drive global investment in reverse logistics. For example, Indian logistics startup Delhivery raised \$275 million in 2021 to improve reverse logistics and other services (Mayank, Aditya & Sonia, 2021). However, DHL reported 40% annual increases in returns, costing businesses \$7 billion yearly. In 2021, EU circular supply chains saved \$380 billion in materials, \$158 billion of US holiday purchases were

returned, and e-waste recycling was projected to reach a \$170 billion market by 2023 (DHL, 2022).

The rise of logistics and e-commerce has driven demand for efficient delivery and return services in forward and reverse logistics globally. In 2021 XPO Logistics launched an automated reverse logistics solution in France to handle 12 million annual returns for an e-commerce fashion retailer (XPO Logistics, 2021). The e-commerce boom has spurred adoption of reverse logistics by major retailers, e-tailers, and 3PLs. Returns are now critical to the retail customer experience, driving reverse logistics adoption across e-commerce value chains (Mayank, Aditya & Sonia, 2021).

1.1.2 Regional Perspective of Reverse Logistics

While a number of developed countries have made substantial progress in implementing reverse logistics practices, developing countries still face significant obstacles and barriers when it comes to putting reverse logistics approaches into practice on the ground. This is despite the introduction of various new environmental laws and regulations by policymakers in recent years (Ezeah & Roberts, 2014). However, a thorough review of the available literature demonstrates and highlights the fact that reverse logistics strategies and solutions are being successfully implemented in certain developing countries and emerging market economies, particularly within the African continent. To illustrate this, Makaleng (2022) found that in 2017 there was a major outbreak of listeriosis, which was formally announced in March 2018 by the South African Minister of Health, ultimately leading to the extensive recall and return of polony and Vienna sausages produced by a company named Enterprise, after these products were conclusively identified as the underlying source of the severe outbreak. The recall of these potentially contaminated goods was recognized as absolutely critical and essential, given that they posed a grave and life-threatening risk to human health and safety, considering that the products had also been exported and distributed to various other countries across the region. By some estimates, the overall recall effort was believed to have amounted to staggering costs of 415 million Rand when all was said and done.

In the Democratic Republic of Congo (DRC), a bottle-to-bottle line in Kinshasa (developed by OK Plast with European technology providers) now washes, sorts and reprocesses post-consumer PET into bottle-grade rPET, creating a local end-market that increases buy-back prices and makes city-scale collection financially viable (Kabongo & Boiral, 2017). By reducing reliance on virgin imports and securing domestic reprocessing capacity, the plant strengthens the reverse flow's value capture and provides a hub for regional PET consolidation. In Cameroon, the government has complemented business initiatives with a National Strategy to Combat Plastic Pollution (2024) that sets out EPR concepts, separate collection, and market-development measures for recyclates—laying the policy groundwork for beverage and food packaging take-back schemes to scale (Ministry of Economy Planning and Regional Development, 2024). As regulatory certainty improves, producers can contract aggregators and recyclers at predictable prices, reducing RL volatility and improving performance outcomes such as lower disposal costs and higher recycled content uptake (Ministry of Economy Planning and Regional Development, 2024).

In Ethiopia, beverage companies are combining classic returnable glass bottle (RGB) systems with PET-recovery upgrades. Heineken Ethiopia operates on a fully returnable packaging model for beer, creating closed loops for bottle collection, inspection, washing and redeployment—an RL backbone that lowers unit packaging costs and waste while raising trip counts per bottle (Muluken, 2022). In Uganda, brewers and soft-drink bottlers are scaling both returnable and recyclable packaging loops. Nile Breweries (2025a) reports that over 90% of its volume is already in returnable packaging, and in 2025 it piloted a technology-enabled glass collection scheme with local startup Yo-Waste to boost retrieval rates and reduce breakage losses—linking route-to-market assets (crates, bottles) with digital pickup and sorting (Nabukeera & Bbaale, 2020). In Tanzania, brands and bottlers formed PETCO Tanzania, a multi-company producer-responsibility coalition to coordinate PET recovery across competing beverage lines—pooling funds, setting buy-back incentives, and contracting aggregators to professionalize post-consumer collection (COPIP, 2022).

1.1.3 Local Perspective of Reverse Logistics

In Kenya, reverse logistics (RL) practices are gradually gaining recognition as businesses, particularly in the food and beverage sector, respond to pressures from environmental sustainability, consumer expectations, and regulatory compliance. Local firms have increasingly realized that RL is not only a compliance issue but also a strategic tool for improving competitiveness and operational efficiency. For example, major beverage manufacturers such as Kenya Breweries Limited (KBL) and Coca-Cola Beverages Africa (Kenya) have long adopted bottle return schemes that allow consumers to return glass bottles for reuse, significantly reducing production costs and waste disposal challenges (Mwaniki & Iravo, 2021). These returnable packaging systems are among the earliest and most visible forms of RL in the Kenyan context, and they serve both economic and environmental purposes by lowering raw material costs and diverting waste from landfills.

Beyond returnable bottles, supermarkets and retail chains in Nairobi have increasingly integrated RL into their inventory management systems. Returns management of damaged or expired goods is now recognized as a way to recover value and maintain customer loyalty, especially within competitive retail chains such as Naivas, Quickmart, and Carrefour (Omondi & Wanyoike, 2022). This has been further accelerated by growing consumer awareness of sustainability and the 2017 Kenyan ban on single-use plastic bags, which pushed many firms to rethink product packaging and post-consumer waste management. Some firms have also initiated take-back programs for used packaging materials, aligning with the government's Extended Producer Responsibility (EPR) regulations under the Sustainable Waste Management Act of 2022, which compels producers to account for the end-of-life of their products (NEMA, 2022).

In the food processing industry, companies are increasingly exploring waste-to-value initiatives as part of RL. For instance, milk processors and large-scale horticultural exporters have adopted by-product recovery systems where waste is converted into animal feed, fertilizers, or bio-energy, thus closing material loops while improving value chain efficiency (Mutiso, 2023). Similarly, initiatives by informal sector recyclers and social enterprises, such as Mr. Green Africa, demonstrate how plastics recovered from consumer

waste streams are reprocessed into raw materials for packaging, thereby integrating RL within circular economy practices in Kenya (Kariuki & Kimani, 2024).

Despite these advances, RL implementation in Kenya faces notable challenges, including infrastructural constraints, high costs of collection and reverse flows, lack of consumer participation, and limited awareness among small and medium enterprises (SMEs) (Nyaga & Njoroge, 2021). Nonetheless, growing policy support for circular economy principles, heightened environmental consciousness, and the economic benefits associated with resource recovery are pushing Kenyan firms, particularly in food and beverage, to strengthen RL systems and integrate them into their broader supply chain strategies.

1.1.4 Food and Beverage Industry

The global food and beverage industry faced numerous challenges in recent years, yet still exhibited steady growth (Panya & Marendi, 2021). According to the Food and Beverage Stores Global Market Report (2023), the worldwide food and beverages market expanded from \$6,729.54 billion in 2022 to \$7,221.73 billion in 2023, representing a compound annual growth rate of 7.3%. However, the market's growth trajectory was disrupted by the Russia-Ukraine war, which negatively impacted the global economic recovery from the COVID-19 pandemic. The ongoing conflict between Russia and Ukraine led to widespread economic sanctions, surging commodity prices, and supply chain problems, spurring inflation across goods and services globally and harming countless markets worldwide. Despite these obstacles, analysts predict the food and beverages market will continue growing in the coming years, potentially reaching \$9,225.37 billion by 2027 at a 6.3% compound annual growth rate (Food and Beverage Stores Global Market Report, 2023).

In Kenya, the manufacturing industry, and specifically the food and beverage sector, represents a crucial opportunity for economic development, job creation, and GDP growth. As the World Bank (2019) estimated, the manufacturing sector guarantees 7.5% GDP growth in both the short and medium term, aligning with the Kenyan Government's Big Four Agenda goals. Consequently, improving manufacturing productivity, especially

in food and beverages, is an urgent priority (KAM Priority Agenda, 2019). Food and beverages constitute the largest manufacturing sub-sector in Kenya, making up 22% of total Kenya Association of Manufacturers membership. Specific sub-industries include dairy, alcohol, juices, baked goods, water, cocoa, soft drinks, chocolate, and sugar (KAM, 2021). Furthermore, food and beverages represent the largest share of Kenyan exports at 46.4% of export value in 2020, followed by industrial supplies at 23.78% (KAM, 2022). This ongoing dominance of food and beverage exports stems from increased primary and processed food and beverage exports for both industrial and household consumption globally (KNBS, 2020b).

Nevertheless, the COVID-19 outbreak and subsequent economic shutdowns in early 2020 caused an economic contraction worldwide as countries implemented policies to slow viral transmission. These policies restricted movement and heavily impacted industrial hubs via supply chain disruptions and lowered consumer demand, leading to a decline in global manufacturing output for both food and non-food products (KAM, 2021). In Kenya, value added by the manufacturing sector dropped from Ksh.191 billion in Q1 2020 to Ksh. 183 billion in Q3 2020. For the full year, the Kenyan economy contracted by 1% in 2020 versus 5.4% growth in 2019 (World Bank, 2020). The pandemic lowered consumer demand domestically and globally, disrupted supply and value chains, prompted job losses, and led to decreased economic activity in manufacturing-reliant service sectors like hospitality due to COVID-19 restrictions (KAM, 2021).

1.2 Statement of the Problem

The manufacturing industry in Kenya has been experiencing a lot of turbulence in the recent past including a drop in the GDP, an increasing imbalance of trade and the exiting of large multinationals (Panya & Marendi, 2021). The contribution of the manufacturing sector to the economy and jobs has been fluctuating over the past few years, as the sector's share of the Gross Domestic Product (GDP) shrank from almost 2.6% in 2019 to -0.3% in 2020. The contribution went up to 7.3% in 2021 then shrank to 2.3% in 2022 and 2.0% in 2023 (Economic Survey, 2024). The food and beverage industry, which is a subsector of the manufacturing industry has not been spared (Muthoni & Mose, 2020). This reduction

in growth has necessitated an increase in imports which has led to a reduction in market share for food and beverage manufacturing firms in Kenya (Ristovska, Kozuharov & Petkovski, 2017). The food and beverage manufacturing sector has also experienced declining customer satisfaction due to supply chain disruptions characterized by food safety scares, shortages and ever-increasing prices (Awino, 2019). This has had ripple effects in the economy whereby there has been increased inflation, competition and imports of substitutes

Value chain performance and efficiency is confronted with dramatic shifts in the market climate and cost control, limiting value chain executives' capacity to respond to these changes. For instance, multinationals such as Nestle, Cadbury, Proctor and Gamble and Eveready have exited the Kenyan market citing unsustainable economic conditions in favor of other African countries such as Egypt (Kamanga, 2022). It is clear that manufacturing organizations are operating at a less competitive stance and inefficient value chain management has been accredited to this poor performance (Muthoni & Mose, 2020). In addition to this, food and beverage manufacturing companies in Kenya have been experiencing declining profitability in their production and operations management (KAM Directory, 2019). Low performance of the value chains is caused by problems such as; scarce resources, waste accumulation, high material cost, disposal and lack of sustainability (Panya & Marendi, 2021).

Globally, literature suggests that practices such as reverse logistics enhance value chain performance by enabling recycling, reuse, remanufacturing, and effective product returns management, which in turn reduces costs and improves customer trust (Govindan & Bouzon, 2018). While these practices have been successfully adopted in developed economies, their application in African contexts remains weak due to infrastructural gaps, low levels of awareness, and policy limitations. In Kenya, research has largely focused on forward supply chain practices such as procurement, distribution, and inventory management (Mutuku & Moronge, 2020), leaving little empirical evidence on how reverse flows affect the performance of entire value chains. KNBS (2017) indicated that 65% of manufacturing firms in Kenya often focus on forward logistics and as a result, they tend to overlook the importance of reverse logistics activities and its potential of

value addition to the value and various organizations. Consumer involvement, on the other hand, increases the quantity and quality of recoverable materials, supplies market intelligence that reduces future returns, and enables new monetization channels such as refill and resale thus boosting value chain performance. Furthermore, the Sustainable Waste Management Act (2022) states that every producer has to bear extended obligations to reduce pollution and environmental impacts of the products they bring to the Kenyan market and the waste arising out of them thus further cementing the importance of implementation of reverse logistics in the value chains of the food and beverage industry.

Many studies treat reverse logistics as a stand-alone sustainability or waste management issue, without positioning it within the broader value chain performance framework. For instance, Wambui (2024) found that RL significantly influences supply chain performance, but did not disentangle this effect from other green procurement practices. This narrow approach fails to capture how practices like recycling, remanufacturing, or customer returns contribute to value addition, efficiency, and resilience of the chain. Majority of the existing studies employ descriptive design and cross-sectional surveys, such as the work by Kiogora, Chege, and Arani (2023), which identified a strong correlation between RL and performance but stopped short of establishing causality. Most Kenyan studies focus on manufacturing and retail sectors, with limited attention to the food and beverage value chain, which has its own challenges such as perishability, stringent health protocols, and high packaging waste. For instance, Mosbei and Ngugi (2014) found that RL significantly boosts performance in food and beverage firms, moderated by regulation, but didn't address perishability or sector-specific dynamics. Mutuku and Moronge (2020) explored RL's impact on Furthermore, empirical evidence on reverse logistics within the Kenyan context is scarce, making it difficult to generalize findings from other industries or regions.

Existing literature has also emphasized the operational benefits of RL practices such as product returns, recycling, remanufacturing, and reuse (Kazemi, Modak, Govindan & Farahani, 2022), but has often overlooked the role of consumer involvement as a critical moderating factor. For instance, Ali, Rahman, & Hossen (2021) found that consumer participation in waste separation significantly improves recycling efficiency, yet few

studies in Kenya explicitly examine how consumer engagement influences RL outcomes along the value chain. Furthermore, little attention has been given to the interaction between consumer behavior and RL strategies in shaping value chain performance, despite evidence that consumer involvement is key in driving returns, product recovery, and after-sales service efficiency (Ismael et al., 2021). Therefore, there is an urgent need to empirically establish how reverse logistics practices influence value chain performance in Kenya, and more critically, how consumer involvement moderates this relationship. Based on these findings on the performance gap in the manufacturing sector, a study was conducted to assess the role of reverse logistics practices on the value chain performance in Kenya's food and beverage industry.

1.3 Objectives of the Study

The study was guided by the following objectives;

1.3.1. General Objective of the study

The main aim of this study was to establish the influence of reverse logistics practices and value chain performance in the food and beverage industry in Kenya.

1.3.2. Specific Objectives of the study.

The specific objectives of this study were;

- i. To establish the influence of recycling practices and value chain performance in the food and beverage industry in Kenya.
- ii. To evaluate the influence of reusing practices and value chain performance in the food and beverage industry in Kenya.
- iii. To determine the influence of remanufacturing practices and value chain performance in the food and beverage industry in Kenya.
- iv. To examine the influence of product returns and value chain performance in the food and beverage industry in Kenya.

- v. To assess the moderating effect of consumer involvement and value chain performance in the food and beverage industry in Kenya.

1.4. Research Hypotheses

H₀₁: Recycling does not have a significant effect on value chain performance in the food and beverage industry in Kenya.

H₀₂: Reusing of products does not have a significant effect on value chain performance in the food and beverage industry in Kenya.

H₀₃: Remanufacturing does not have a significant effect on value chain performance in the food and beverage industry in Kenya.

H₀₄: Product return does not have a significant effect on value chain performance in the food and beverage industry in Kenya.

H₀₅: Consumer Involvement does not have any moderating effect on the relationship between reverse logistics practices and value chain performance in the food and beverage industry in Kenya.

1.5. Significance of the Study

One of the most significant changes in modern business management is that businesses focusing on value chain optimization are no longer competing solely as autonomous entities but as value chains. Therefore, organizations in the food and beverage industry in Kenya need to have information about reverse logistics practices and how they influence value chain performance in order to improve efficiency and effectiveness of their operations.

Various researches have been conducted in the field of value chain management and other related areas however there is limited information on reverse logistics practices and how they influence the value chain performance of the manufacturing sector, with a focus on the food and beverage industry around the world especially in developing countries. Thus

this study may uncover information that may build information on value chain management, reverse logistics and their influence on the value chain performance of organizations in the food and beverage industry in Kenya.

1.5.1 Researchers and Academicians

The findings of the study provide a source of reference for other researchers. In addition, academic researchers, may need the study findings to stimulate further research in this area and as such form a basis of good background for further research.

1.5.2 Supply Chain Officers

The findings of this study provide various stakeholders with information or tools to enable them to better manage reverse logistics strategy formation and execution so as to derive benefit from the cost savings, customer satisfaction and profit margins it presents. It enables the officers to focus on reducing process times, building lean networks and optimizing use of technology to reduce costs and expedite product delivery and conformance for customer satisfaction. This in turn assisted in strategy formulation, implementation and evaluation and deters the practice of managing the value chain as a disjointed network.

1.5.3. Government of Kenya

Policy makers gained information on the impact of reverse logistics and unique challenges the value chain encounters and they are in a better position to design policy and allocate resources to alleviate these challenges thereby increasing the success rate of reverse logistics. These could translate into more targeted access to financing to ensure acquisition of specific reverse logistics technology and training of staff and management in value chain activities.

1.5.4 Private Organizations

The findings of this study provides private organizations with insights into enhancing operational efficiency through the effective management of reverse logistics. The

organizations, through implementation of reverse logistics, will also acquire the techniques in order to enhance customer satisfaction and loyalty, as efficient handling of returns, warranties, and product recalls fosters trust and improves after-sales service, positively impacting the organization's value chain performance. Lastly, reverse logistics aligns private organizations with national and global sustainability goals, supporting regulatory compliance, promoting responsible consumption and production, and contributing to broader social and environmental objectives.

1.6 Scope of the Study

This study focused on the role of reverse logistics practices and value chain performance in the food and beverage industry in Kenya. The reverse logistics practices under consideration were recycling, reusing, remanufacturing and product returns and the moderating variable was consumer involvement. The target population of the study involved 90 firms within the food and beverage industry and the sample size comprised of 74 companies in the food and beverage industry within Kenya who have implemented reverse logistics practices within their value chains. Its focus was on operations officers who deal with the manufacturing, usage and reverse logistics process in one way or another and their actions affect the value chain performance of the institution. The study was carried out between September 2022 to March 2023 throughout the country of Kenya. All other necessary sources of information such as institutional journals, website and records formed part of the study.

1.7 Limitations of the Study

The organizations had confidentiality policies which restricted some responses as they would be going against the regulations. Some organizations were wary of responding to the questionnaires as they had no idea what the study was going to be used for. The researcher assured the respondents of utmost confidentiality and they assured them that this information was purely for academic purposes. Another limitation of the study was that some of the organizations had different structures in their various departments. For instance, some respondents were operations officers, others were supply chain officers

and others were heads of procurement. Thus the understanding of the questions was different thus the researcher had to go through the questionnaires with the respondents to ensure the responses gotten were the desired responses. Finally, the respondents were at times unavailable for feedback while others took a lot of time for feedback. It was mitigated by giving them more time when needed, do follow ups and being friendly.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter formed analysis and elaboration of the past reviews relevant to the research study. Resourceful and reliable past work information was critically analyzed regarding what had been done and existing gaps that previous studies failed to resolve. This chapter was generated in terms of introduction, theoretical framework, conceptual framework, empirical review of literature, critique of the reviewed literature, research gaps and summary of the reviewed literature.

2.2 Theoretical Framework

Cooper and Schindler (2014) defines a theory as a set of interrelated concepts, definitions and prepositions that have been put forth to explain a scenario. Theories lay the foundation upon which research is built. They provide a particular perspective or lens through which a topic is examined.

2.2.1 Institutional Theory

Selznick (1948) proposed that there are structures, rules, norms and routines that act as the framework for behavior. Institutional theory is recognized through the pressures of social, cultural, political, and legal sectors as primary factors influencing organizational operations (Yang & Sheu, 2011). The institutional environment is defined as an entity that lies outside the boundaries of the organization. It influences organizational outcomes by imposing constraints on firms' operations and demanding adaptation of firms' processes to survive. Furusten (2013) indicated that according to the institutional approach under the organizational field, there are three isomorphic mechanisms of pressures by which imitations in structure and processes between organizations are motivated: coercive, mimetic, and normative. Each of these types leads to an increased homogenization within a given organizational field.

Coercive influence derives from formal and informal pressures carried out on organizations by other organizations upon which they depend. Such forces can be exerted through persuasion, an invitation to join shared behavioral models, laws, regulations, and government mandates. Coercive powers are typically given to governmental authorities by issuing rules and regulations. Mimetic influence is a firm's standard response to environmental uncertainty by imitating themselves as other organizations, for example, using lean or agile manufacturing in production, just-in-time in sourcing, and efficient customer response in distribution (Furusten, 2013). Normative influence arises from the high degree of socialization and interaction between members of the same organizational environment. When these members interact, they reinforce and spread behavior norms among themselves (Miles, 2012). Organizations attempt to conform to easily recognizable and acceptable standards within the organizational field, which helps foster the organization's legitimacy. The institutional theory describes how deliberate and accidental choices lead institutions to mirror the administrative field's norms, values, and ideologies. As a result, organizations that meet the environment's common characteristics receive legitimacy and prove worthy of resources by society and the broader environment. The substantial body of work on institutional theory derives from the research literature on institutional sociology (Glover, 2014).

Organizations that possess the ability to recognize and react to signals in the external environment have a competitive advantage over organizations that are less flexible and agile. The capability to recognize and react to societal drivers towards ecological sustainability requires effective reverse logistics. Growing concerns about climate changes, local and regional impacts of air, ground and water pollution from industrial activities have significantly expanded the interaction between environmental management and operations (Vlachos, 2016). Institutional theory also implies that a strong motivating force behind firm behavior is socially based and proposes that an organization is bound to satisfy its social stakeholders. Specifically, companies not only need to recognize and react to signals from their institutional environment but also conform to its rules. This ability is more dynamic and complex than the ability to react to institutional environments since an organization has the ability to react to its business environment. For example, upstream suppliers' raw materials defect or errors in design, production, and assembling

may directly generate great influence on the reverse logistics of downstream enterprises or even the entire value chain (Vlachos, 2016).

Institutional theory emphasizes that organizations adopt certain practices not only for efficiency but also to conform to regulatory pressures, societal expectations, and industry norms. This is relevant to this study as it explains the importance of recycling practices on value chain performance. A life cycle assessment (LCA) of mobile phones found that recycling the electronic scrap of mobile phone networks have clear environmental benefits which in turn suit the requirements of the environment in which this industry is located in (Guersola, Pinheiro de Lima, & Steiner, 2018). Material recycling could help lower the environmental impact of the production phase by up to 50%, in turn this reduces operational costs and boosts efficiency of the production. Organizations with properly managed value chain operations can use recycling to enhance their economic performance since they are able to create value in products that had already lost value. This is done through the repair and overhauling of an item in order to revive the original product or bring back to life the dead product thus promoting value chain performance and gaining traction in the eyes of the consumer and making the organization to embrace its internal and external environments.

2.2.2 Social Network Theory (SNT)

Barnes (1954) proposed that social relationships can be viewed in terms of nodes and ties where nodes are the individual actors within the networks and ties are the relationships between the actors. There can be many kinds of ties between the nodes. In its most simple form, a social network is a map of all of the relevant ties between the nodes being studied. According to Lu (2018), the social network theory is a theory that applies to a variety of levels of analysis from small groups to entire global systems and is important when examining the structure of inter-organizational relationships in a value chain which has been brought about by the increased interlinked decision making approaches. The SNT is one that measures the number of ties in a network that links actors together and also the position of an individual firm in relation to the flow of information. As network centrality

increases however, the organization's ability to resist external pressures also increases (Zhu & Liu, 2010).

Accordingly, if an organization has many branches, customers and suppliers, and there is a general awareness in the public, it is likely to be under greater pressure to adopt reverse logistics practices. This adoption of reverse logistics practices for such a firm will thus be more or less reactive (Rodriguez-Rodriguez, 2015). Although it could be argued that constructs of SNT can largely help analysts explore relationships between value chain actors at both levels, there have been very few studies that employ this theory in the value chain management context. Social networks enable efficient application of value chain performance which a firm can benefit from its central position to champion and monitor product returns through both "hard" material/money flow and "soft" alliances and sharing-of-information types of ties (Mobolaji, 2017).

Vlachos (2016) argues that firms rarely create value in isolation; rather, they align themselves with customers, suppliers, and other partners to co-develop and co-expand existing markets through value chain integration. Value chain integration refers to the degree to which a manufacturer strategically collaborates with its value chain partners and collaboratively manages intra- and inter-organization processes. It represents the exchange mechanism of resources and knowledge in a value chain which is key in product returns. Value chain coordination is another dynamic capability which is important for product returns. Coordination can be achieved via different governing mechanisms such as market mechanisms, contracts, and partnership arrangements. It allows for investment in assets specific to product returns which reduces uncertainty. Because different consumers return products at different times, volume uncertainty, which is created by poor forecasting of future demand patterns, is reduced by sharing of strategic information between retailers and manufacturers like trends in consumer behavior that leads to returning of products (Vlachos, 2016).

Social network theory underscores the role of relationships, trust, and information exchange among actors within and outside the organization in shaping outcomes. In the context of reverse logistics, effective handling of product returns depends on networks

involving suppliers, distributors, retailers, and customers. Strong social networks facilitate quick feedback loops, transparency, and collaboration, which reduce return processing time and costs, thereby improving value chain performance (Mutuku & Moronge, 2020). Linking this to the research objective of assessing the role of product returns practices on value chain performance, social network theory provides a framework to show how the quality of inter-organizational connections directly influences efficiency and responsiveness in product returns management

2.2.3 Resource Based View Theory (RBV)

Penrose (1959) viewed firms as a bundle of resources which when properly manipulated enables them to achieve competitive advantage which in turn leads to superior long-term performance. Developments on the RBV theory have directed attention towards the nature of resources and their positioning that might create barriers and economic dents for competitors (Zamora, 2016). Resource-based view (RBV) explains how the unique deployment and combination of tangible and intangible resources might assist companies to achieve a sustainable competitive advantage because capabilities are more difficult to imitate or substitute and therefore add greater value to the firm (Priem & Swink, 2012). It argues that for a firm to gain competitive advantage, it must possess resources that are rare, difficult to imitate, non-substitutable and valuable. In this regard, Bohnenkamp (2013) identified value, rarity, imperfect imitability and imperfect substitutability as essential characteristics of resources to generate barriers and advance competitive advantage.

However, Chae (2014) hypothesized that RBV considers a network resource notion to use its explanatory power in value chain environments. Applications of RBV in value chain management are mainly focused on structural analysis and identification of the antecedents for competitive advantage in the value chain (Pearson, Masson & Swain, 2010) since majority of value chain management decisions are underpinned by RBV, at least implicitly. In order to respond to uncertainties and changes, companies form inter-organizational arrangements to enjoy resource-position barriers built through collaborative efforts. This is particularly true in situations where scarce resources or

intense competition make organizations realize that relying only on internal resources is insufficient to secure competitive advantage.

The resource-based view (Barney, 1991) posits that firms gain sustainable competitive advantage through valuable, rare, inimitable, and non-substitutable resources. Remanufacturing practices create opportunities for firms to leverage unique capabilities, such as specialized technology, skilled labor, and innovative processes, that enhance cost efficiency and product differentiation. By effectively managing remanufacturing, firms not only reduce waste but also strengthen their internal competencies, thereby improving overall value chain performance. This connects with the study objective of establishing the role of remanufacturing practices on value chain performance, as RBV explains how remanufacturing enables firms to build and sustain competitive advantages in dynamic markets (Kihara, Bwisa, & Kihoro, 2016).

2.2.4 Michael Porter's Value Chain Model

In the extremely competitive markets of today, supply chains are competing against supply chains for competitive advantage. It is therefore necessary to incorporate competitive strategies into the value chain of a firm. Supply chain value is the difference between the worth of final product to customer and the costs borne by the supply chain to fulfil its customers' needs (Zamora, 2016). Porter popularized the concept of value chains in 1985 and stated that a value chain is a set of activities performed by a firm to create value from delivery of a product or service to the market (Zamora, 2016). The competitive strategy paradigm Porter developed categorized the value chain operations into primary and secondary activities (Dubey, Singh, Singh, Mishra, & Singh, 2020). The activities of inbound logistics, operations, outbound logistics, marketing and sales, and services were classified as primary activities (Zamora, 2016), while procurement, human resource management, infrastructure, and technology development were grouped as support activities. According to Strakova (2020), a value chain starts with the development of a new product which is marketed and publicized based on the customer needs that will be satisfied by this product. The results of marketing are re-assessed before starting the operations to create the actual product. Distribution deals with customers meeting the

products, while service looks into customer requests during and after sales. The secondary functions facilitate functioning of the value chain.

Value chain analysis (VCA) is the strategy tool wherein a firm identifies the primary and support activities that adds value to the final product and analyzes them to either reduce costs or increase differentiation (Abdi, 2010). The value chain concept is not restricted to firms and can be applied to entire supply chains and distribution networks. This series of supply chains of the firm's suppliers, the firm's distributors, the firm's buyers, and the firm itself is collected termed the 'Value system'. The firms can combine the value chain model with other models in order to identify the areas for improvement. Zamora (2016) stated that the SWOT analysis (Strength-Weakness-Opportunities-Threats) of any of the value chain functions could give a better picture of how to improve the supply chains in the organization. The value chain focuses on close relationships between the functional strategies within a firm, as each function is crucial to value creation. Therefore, selective implementation of strategies across functions is not going to lead to uniform surplus or value creation, nor customer satisfaction.

A supply chain strategy determines the nature of procurement, manufacture, transportation, distribution, and follow up services along the value chain (Kumar, 2013). It is the pattern of decisions taken up on supplier and customer management, based on product sourcing, capacity planning, demand, communication and delivery of products. Supply chain strategy not only explains the operations to be taken up by firms but also the roles to be played by the involved entities. It is a combination of logistics, operations, and supplier strategies. Supply chain design decisions related to inventory management, transportation, operations, and information flow also comes under supply chain strategy. For instance, Amazon's decisions to use warehouses and distributors for different products and Dell's decision to sell their computers through retailers' post 2007 are part of their supply chain strategies. This theory is relevant to this study in determining the role of reverse logistics practices on value performance as well as evaluation of performance as a measure in its value chain. Porter offered five undeniable forces that can be used by businesses and play an important role shaping the market or even the industry. The forces

are used broadly in the process of measuring profitability, attractiveness, and intensity of competition (Porter, 2010).

2.3 Conceptual Framework

A conceptual framework is a representation of the main concepts or variables under study and their presumed relationship with each other and it is a scheme of variables/concepts the researcher operationalized in order to achieve the research objectives (Imenda, 2014). The conceptual framework used in this study is indicated in figure 2.1. The dependent variable is value chain performance and the independent variables are recycling practices, reusing practices, remanufacturing practices and product returns while the moderating variable is consumer involvement. Kenya's food and beverage industry faces high volumes of packaging waste, returned goods due to quality concerns, and rising regulatory/environmental pressures. Recycling, reusing, remanufacturing, and product returns are practically observable and highly relevant in this sector. For example; many firms are under pressure to adopt recycling of packaging materials due to environmental laws (NEMA, 2022), product returns are a significant issue in supermarkets and distributors due to spoilage and defective goods and remanufacturing and reusing (e.g., bottles, crates, and containers) are already common industry practices, making them suitable for study. Other RL practices such as refurbishing, cannibalization, or disposal may be less prevalent, less regulated, or less relevant in the Kenyan food and beverage context, hence excluded.

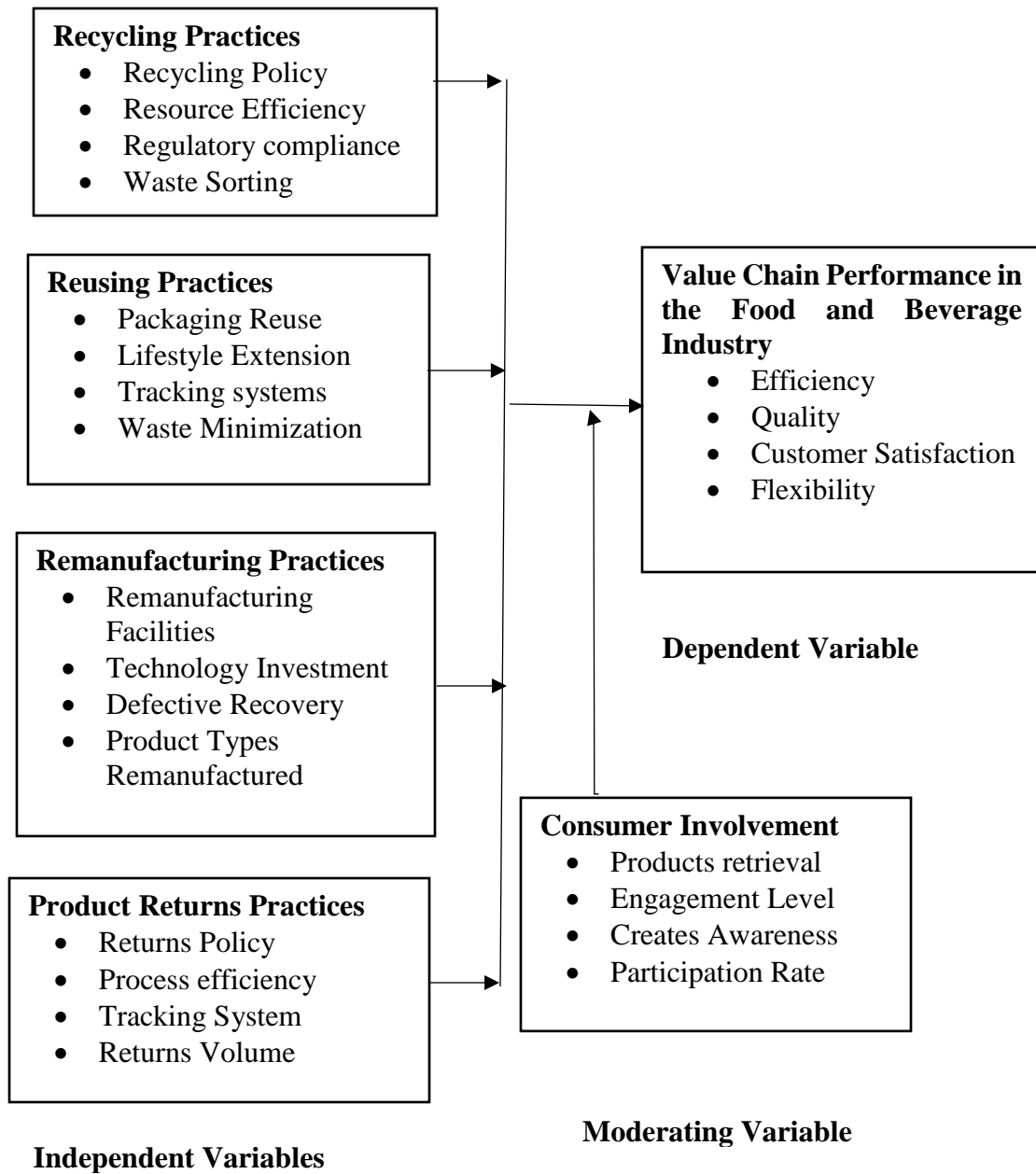


Figure 2.1: Conceptual Framework

2.3.1 Recycling Practices

Recycling is the process where an organization collects non-reusable or destroyed products from the consumer with the aim of entirely modifying them again into new

products, either of same kind or of different form. Examples of recyclable materials are plastic items, paper, glass, batteries, bulbs and metal materials (Panya & Marendi, 2021). The process of recycling begins from bin collection where bins containing recyclable materials are collected and transported to the firm. The materials are sorted, cleaned and then processed depending on the materials to be recycled. For example, steel cans are sorted using a magnet separation process. Since most recyclable materials—such as plastics, metals, and glass—are non-biodegradable, recycling is critical to environmental protection, effectively preventing long-term pollution and conserving natural resources (Environmental Business Review, 2024). Such firms remove millions of tons of non-biodegradable wastes from the surroundings. Other firms opt to pay recycling firms to recycle their destroyed products. If a firm recycles its products, it gets huge amounts of returns and greatly decreases its environmental pollution. Recycling is a cheaper process of generating raw materials to ensure that the firm is able to produce more products and thus satisfy the market in terms of mainstreaming and sustaining its value chain.

Large-scale firms that produce or manage non-biodegradable materials often evade the direct environmental costs of their inputs. However, due to their market dominance and scale, they face heightened scrutiny and regulatory pressure, compelling them either to mitigate environmental risks or face substantial financial penalties for environmental harm (Li, Wang, & Wu, 2024). Due to the fact that such firms reduce their respective environmental impacts, they inherently appear responsible and sensitive. The huge cut-downs on production costs have a positive effect on the ability of a firm to afford modern technology, thus these firms are able to add new features such as rebranding. This ensures that the newly reproduced products are of better quality and more appealing to consumers. This in turn increases sales which translate to large amounts of profits leading to increased customer satisfaction. There is a huge link between recycling and value chain performance. Recycling saves a firm the cost of transportation of materials to be disposed and the cost of land acquisition for a landfill (Saruchera, 2021). For instance, in New Zealand, the setup costs for a landfill vary between \$2m to \$30m with annual capacities of between 10,000 tonnes to 500,000 tonnes (Panya & Marendi, 2021). Secondly, recycling saves the firm energy consumption and promotes material recovery since the material usage per unit of output is reduced and therefore yields improved eco-efficiency.

Thirdly, recycling promotes environmental conservation. According to Salim & Odock (2016), over 2,000,000 plastic bags are generated in Nairobi. This shows a growing concern for the need to recycle. When a firm recycles for the sake of being more environmentally responsible, consumers would find it more legitimate therefore they would be more willing to buy the firm's products.

In the food and beverage industry, the recycling of packaging containers is a better alternative and constitutes a lesser environmental burden compared to land filling or incineration. In most instances, packaging materials are not designed for reuse thus recycling is the most viable option to recover the value in them. However, the packaging material should be designed to be recyclable right from the developmental phase of the product to make this process easier (Mobolaji, 2017). The recycling of packaging materials reduces waste and conserves natural resources and energy that would otherwise be consumed in extracting and processing virgin raw materials. In addition, recycling allows producers of food and beverage containers to generate secondary raw materials—substitutable for primary inputs or used in other value chains to produce items like glass wool, textiles, bicycle wheels, and kitchen utensils. However, recycling programs are cost-intensive at every phase—from collection and sorting to processing and reintegration—reflecting substantial financial, operational, and technical demands which can overwhelm the producers of the containers if the costs are not adequately catered for in the recycling plan (Asare, Oduro-Kwarteng, Donkor, & Rockson, 2022).

Jane (2025) asserts that companies in the food and beverage industry often issue warranties on durable packaging to ensure consumers can return products for replacements or incentives. This practice not only reinforces customer confidence but also reduces logistical costs associated with collection and transportation (Brand Equity & Warranty Costs Study, 2022). Meanwhile, recycling initiatives are shown to lower overall manufacturing costs through resource recovery and operational efficiencies (Recycling Cost Efficiency Study, 2023). Further, tailored awareness campaigns significantly increase consumer engagement in recycling practices, leading to measurable improvements in firm efficiency and sustainability outcomes (Awareness & Recycling Behavior Study, 2025). However, there remains a gap in the literature on how product

recyclability awareness specifically influences both operational efficiency and value chain performance in organizations, particularly in terms of non-manufacturing dimensions

For recycling to contribute to performance in the contemporary organization, it has to be underpinned by well documented recycling policy. The principles of action inherent in a policy document allow the organization employees to meet the specifications of recycling and thereby reduce costs which why recycling activity is undertaken (Zigler, 2023). On a study to establish how organizational policies contribute to organizational financial performance, it was found out that organization policy contributed to performance because every action was aligned to principles of action that had been established by the organization research and development department. This study however is too general; it measures the entire organizational policy and fails to particularly concentrate on recycling policy on value chain performance. But recycling can only be possible if the products that are with end users are available for recycling. It brings to the fore the imperativeness of structured market incentives. Essentially, market incentives encourage the end users of the product to take back which they no longer use for whatever reason to be recycled. More recently, Thiga, Chege, and Arani (2023) found that green procurement and reverse logistics practices—including incentive-driven take-back systems—significantly improved operational performance in Kenya’s food and beverage manufacturing sector,

2.3.2 Reusing Practices

Reusing is the process by which unused or slightly used products are distributed back to the supply chain without any upgrade or processing being involved. This means that reusing saves the energy that would be required from recycling or remanufacturing. Through re-use customers return un-used products to the seller or retailer for similar or alternative uses. Reuse entails return of reusable packaging materials such as crates, bottles etc. These returns back to the seller or manufacturer are managed through the process of reverse logistics (Muthemba & Mwanyota, 2016). However, the value of the product is reduced since no manufacturing is done to improve performance or restore it to a new-like state. The process of reusing generally involves inspection and sorting of the products, conducting repairs without the need for processing, cleaning of the products in

preparation for reuse and finally distributing the products to the customers. Ketzenberg, Abbey, Heim, & Kumar (2020) stated that customers return products that are either completely unused or that are partly used. For partly used products to be reused, the products should be in a position to be used without any upgrade or modification. Products that are not in the usable state must be channeled back to the manufacturers through reverse logistics either for repair or re-development. Reuse also involves repairing, refurbishing, washing or recovering used products. Packaging can also be reused which can prolong the item's useful life and delay final disposal or recycling.

In the food and beverage industry, one of the oldest prohibitive laws and packaging legislations in the world is the Oregon bottle bill act of 1971. It was enacted at a time when indiscriminate disposal of waste was the order of the day and the city of Oregon and its water bodies were littered with empty beverage containers. The bottle bill was introduced to promote the reuse and recycle of used beverage containers (Wankmüller, Rodríguez, & Mahler, 2023). The legislation imposes responsibilities on both consumers and producers to return containers to points of sale or designated centers in order to reclaim the deposit. By requiring a refundable deposit on beverage containers, the law serves as a potent economic incentive to encourage proper return behavior and reduce environmental degradation.

The reusing of packaging materials is the second best option on the hierarchy of waste framework after the prevention of waste via reduction (EU directive 2008/98/EC). Packaging reusability is best done also when provision has been made for its reusability in the design phase of the product" (Mobolaji, 2017). It also entails the logistics involved in returning used beverage containers or glass bottles to the place of production, where they are washed and refilled in an environmentally sound manner that do not compromise public health. Glass bottle is a typical example of reusable materials, they are 100% reusable through bottle refilling (Mobolaji, 2017) and some plastic bottles are also refillable. Reusing contributes to value chain performance in many ways. Firstly, reusing saves energy because there's no processing involved which promotes cost savings (Saruchera, 2021). Secondly, reusing means that products can swiftly be taken back to the market so dependability and speed of delivery is improved.

Muthoni & Mose (2020) however posted different findings in his study. It was established that cases where completely unused or slightly used products were rare and could not be relied upon by organizations for quality enhancement. These studies however only concentrated on quality standards for reuse on enhancing product quality leaving out setting quality standards for reuse on value chain performance. Designing products for reuse is as well a great strategy in ensuring improved value chain performance. Whenever customers take back the products or packaging to the suppliers for reuse, the general cost of the producing similar products and packaging materials are reduced tremendously.

Vegter, van der Laan, Liebl & Reiner (2022) justified that designing products and packaging for reuse contributes to value chain performance by extending the lifecycle of materials and reducing dependency on virgin resources. They argued that reusable systems significantly lower raw material extraction, energy consumption, and water usage when compared to single-use systems. This efficiency not only reduces environmental costs such as landfill waste and emissions but also enhances operational savings across the supply chain. By minimizing waste management expenses and improving resource productivity, reuse strategies were shown to create measurable benefits for supply chain actors, thereby strengthening overall value chain performance.

A study exploring how disposing of industry rejects affects performance found that reusing packaging materials completely eliminates disposal costs. However, this research didn't indicate whether such reuse enhanced operational efficiency. Similarly, returning used products and packaging to suppliers for reuse can reduce remanufacturing expenses, although the study focused only on customer satisfaction and didn't examine broader value chain performance. In contrast, a more recent analysis demonstrates that take-back and reuse of packaging—such as polystyrene boxes—can significantly reduce packaging procurement costs and handling burdens, thereby improving supply chain cost-efficiency (Hu, Kumar, & Sharma, 2022).

2.3.3 Remanufacturing Practices

Wainaina (2014) states that remanufacturing is a form of reverse logistics practice that uses an industrial process where a previously sold, leased, used, worn or non-functional product or part is returned to a like-new, same-as-when-new, or better-than-when-new condition from both a quality and performance perspective, through a controlled, reproducible, and sustainable process. Generally, remanufacturing firms collect used products in order to improve on their efficiency or usability after which they are resold back to consumers. In remanufacturing, a firm collects all used products from the customers thus the timing and quality of the used products are usually unknown. In the past, remanufacturing was typically limited to supporting business to consumer (B2C) warranty, customer returns, and business to business (B2B) return of capital-intensive “core” products (such as engines and industrial goods) to long-term service, within a domestic or regional marketplace. While these applications remain, new reasons for entering the remanufacturing market are growing such as new market development, customer service, value-chain development, sustainability and research and development (Enigbokan & Enigbokan, 2025).

Remanufacturing directly serves the growth of the reverse supply chain, sustainability and value-chain, and research and development. In addition, it serves more traditional functions including warranty, maintenance repair, and overhaul (MRO), and customer request. Combined, remanufacturing increasingly supports high-priority goals, competitive practices, and critical customer service functions (APICS, 2022). Achieving profitability in remanufacturing, in part, relies on operations management which seek to maximize flow and yield, despite constant variation. Remanufacturing follows the following steps; after acquisition, a product undergoes an initial examination to confirm it is suitable for remanufacturing. The product, or the core of the product, must be free from unusual wear, damage, or missing components that would otherwise disqualify it. This step may also capture precise data about the condition or state of the product in order to document, plan, or refine future remanufacturing production schedules and component inventory levels. Then there is disassembly which seeks to balance speed and productivity while preserving as much product or component value as possible. Where possible,

disassembly reverses original new product assembly steps. In other cases, where a product was not designed for remanufacturing, disassembly may create damage (while this damage will be restored in later steps, it can be costly to the remanufacturing business). The depth of disassembly is governed by determining what is needed to ensure the remanufactured product meets new product specifications and capabilities (APICS, 2022).

After disassembly, there is component inspection and decontamination which evaluates and identifies components for further processing. This step may discard some components while retaining others. Retained modules and components typically undergo recovery cleaning or decontamination to remove the by-products of use, wear, or aging. Then components discarded in the previous step are replaced from remanufacturing component inventories. Remaining components are restored to like-new condition. In a remanufacturing inventory-pool model, final reassembly proceeds when inventory levels call for additional remanufactured stock. An inventory pool ensures that a remanufactured product immediately ships upon receipt of a used product. Reassembly may also involve steps where remanufactured goods are required by law to be labeled, documented, or tracked. Then, products undergo quality assessment to ensure each objectively meets the standards of newly manufactured products. This may involve testing every product to satisfy regulatory or marketing claims. This step may also document specific quality assurance data as required by the customers, regulators, or industry practice (APICS, 2022).

Remanufacturing relies on a supply chain of original product buyers to become suppliers to the remanufacturing process. This reversal creates and preserves value for three parties: the owner of the worn product who sees value when a remanufacturer offers an acquisition price higher than the products scrap value, the remanufacturer who sees value in acquiring a worn product at a price that does not include much of the energy, labor, material and design expense originally expended to create the product when new and the future buyer of the remanufactured product who sees value in acquiring a product as good as new but at a lower price than the new production product cost. The remanufacturing marketplace helps to establish competitive ongoing value to all parties (van Loon & Van Wassenhove, 2020).

Eventually, a remanufactured product will be refurbished, recycled, or scrapped when remanufacturing is no longer profitable. This may occur even if a remanufactured unit remains physically capable of serving its purpose in its market. Part of the reason for this is the difficulty of global trade for many remanufactured products. In many nations, remanufacturing is active in the areas of transportation equipment, computer or telecommunications devices, medical devices, audio or visual instruments and commercial and industrial equipment (particularly in agriculture, mining, construction, printing-copying, utilities, heating and air conditioning, baking, vending, and musical instruments). However, current trends are changing because remanufacturing is well suited to products, industries, and market trade where products have durable or long life spans, high cost or complexity when new which helps create value for remanufacturing, market and regulatory recognition or approval of remanufactured products, predictable wear or usage patterns and standardized designs even over multiple product versions or generations (Cannella, Bruccoleri & Framinan, 2016).

Businesses see remanufacturing opportunities particularly where: Industries recognize product value not just for product materials but for their inherent design, intellectual property, or regulatory approved status; Markets accept and trust the “as-good-as-new” concept; Good customer service and support ensure remanufactured products become solutions, not just price-sensitive commodity items. The process of remanufacturing is beneficial to remanufacturing firms and their value chains in a number of ways. For one, remanufacturing firms are not required to produce new products from scratch. This means that there is a huge cut down on the costs of generating raw materials to make new products. In fact, the cost of raw materials for many such firms is reduced by over 70 per cent (Enigbokan & Enigbokan, 2025).. Since the consumers are expected to return used and faulty products to the remanufacturing firm, the process saves the firm almost all its transport costs. Transport costs are a major barrier to profit maximization which is the main objective of the firm. For remanufacturing firms, transport costs are only incurred while transporting remanufactured products back to the consumer (APICS, 2022). Through remanufacturing, firms are able to produce a large variety of products in the market within a short period of time. Remanufacturing practices enable manufacturing

firms to achieve efficient value chain networks that are able to save costs and deliver quality products to customers.

2.3.4 Product Returns

The products that have already joined the value chain may also be channeled back on grounds of being defective or of poor quality or their functions are no longer needed. In the practical business environment, products that majorly reverse their course in the value chain are; manufacturing returns, commercial returns, recalled products, warranty returns, service returns, end-of use returns and end-of-life returns. Manufacturing returns refers to all those cases where components or products have to be recovered in the production phase. This occurs for a variety of reasons such as raw materials may be left over (products are not needed), intermediate or final products may fail quality checks and have to be reworked and products may be left over during production. Distribution returns refers to all those returns that are initiated by a value chain actor during distribution after the product has been made (including the manufacturer). It refers to product recalls, commercial returns, stock adjustments and functional returns. Product recalls are products recollected because of safety or health problems with the products, and the manufacturer or a supplier usually initiates them (Shaharudin, Govindan, Zailani & Tan, 2015).

Commercial returns are all those returns where a buyer has a contractual option to return products to the seller. This can refer to wrong/damaged deliveries, or to unsold products that retailers or distributors return to e.g. the wholesaler or manufacturer. The latter include outdated products, for instance those products whose shelf life has been too long, such as pharmaceuticals and food, and may no longer be sold. Functional returns concern all the products that its inherent function makes them going back and forward in the chain. An example is distribution carriers as pallets as their function is to carry other products and they can serve this purpose several times (Zhou, Naim & Disney, 2016). Customer returns, those returns initiated by a customer or user and/or as a result of consumption/use have a variety of reasons to return the products such as, reimbursement guarantees, warranty returns, service returns (repairs and spare-parts), end-of-use and end-of-life of an item (Mostert, 2017). Returned products often go through a recovery process which

involves; product/materials acquisition, products/materials collection, product sorting, testing, products recovery and depending on the final state, product redistribution and sales or disposal (Kabergey & Richu, 2015).

According to Mostert (2017), in the UK all food retailers recycle packaging materials in a central facility: either a distribution center or a separate recycling unit. The manufacturers also decide upon the explicit return policy. For instance, stores have to know which products can or must be returned to the warehouse in which situations, or how to grant permission for this. Returned products may have a quality status that differs from new. Depending on this status and the timing, they may be sold in the same market (e.g. early in the season reimbursement returns) or not (namely leftovers or end-of-life returns). Both newly supplied and (as-good-as-new) returned merchandise are going to be stored for future sales as long as the season runs. The two streams can be stored separated or the merchandise can be consolidated in the same location. Also, reusable crates are mostly used for product categories such as produce and chilled, where warehouse stocks are small and sales volumes are high. This means the crates are used intensively, reducing the cost per trip. However, wholesalers and retailers with many suppliers and different pallet types have considerable work in handling, sorting and storing pallets returned from their customers (retail organizations or stores).

In case of large return volumes, mechanization or automation may become economically attractive. Here there is to choose for example which type of vehicles should be used to load and pick up products from the warehouse shelves. At this level, one has to determine which information system is going to be used to register product returns. Mostert (2017) examines the overall needs and existing supporting technology for managing information in the reverse logistics context. Commercial software particularly designed for supporting return handling is however lacking. The commonly used ERP packages generally lack the ability to properly deal with returns (Jeszka, 2014). At this stage decision-makers may consider the in-house development of dedicated software. The specialized software system checks returns for expiration date and damages speeding up return handling. Besides this, the software is linked to an automatic sorting system, which has lowered labor costs.

In general, it has to be determined the type of information to be registered, for how long and how decisions with respect to returns can be supported. Also attention is given to potential abusive returns (Mostert, 2017) and how this affects warehousing operations. Returned merchandise is first checked and only then it is decided whether the client should be credited for it. When storing returns, that work has to be planned in coordination with forward operations such as order picking and internal transport. To put returns back in inventory timely is crucial, to prevent stock outs. Various sellers and retailers impose a timeframe of accepting returns to a number of weeks after delivery or purchase. In reality, various charging schemes including partial refundable costs exist. Schemes to charge returns and some of the associated dilemmas exist, for instance how to control opportunistic returns. Zhou, Naim & Disney (2016) noted the relations between return policies and a number of elements such as salvage value, mismatching probabilities, speed of consumption, product's value to the consumer and product's quality. If return rates are high, for instance in online selling platforms, it becomes necessary to manage return stocks explicitly since the sellers could be overselling to customers who return merchandise and underselling to customers who do not return merchandise. The customers could be classified into the two categories based on historic data and priority will be given to customers who do not return products to the organization.

2.3.5 Consumer Involvement

Contemporary research increasingly positions consumers as active partners in value creation rather than passive recipients. Beyond simply purchasing products, consumers co-design, co-produce, and co-market service experiences, especially within digital and virtual communities (Sahaziz, Melewar & Alnassar, 2022). Their influence extends to sustainable supply chain decisions, customers now pressure firms to source from eco-friendly suppliers and choose resources aligned with environmental criteria. Moreover, consumers play a direct role in reducing resource consumption by offering their own assets—for example, bringing reusable cups or preferring hotel dispensers over single-use bottles, thus actively contributing to waste reduction and operational efficiency. Customers can also influence value chain performance by eliminating or reducing resource use through providing their own resources such as self-service or through

advising and helping firms to reuse or share resources, such as supporting cup-reuse programs by purchasing a reusable cup or mug or by using amenity dispensers in hotels, rather than amenity bottles

Yeo and Lee (2023) showed that involvement can motivate consumers to adopt positive behavior. Customers' adherence to sustainability norms are primarily influenced by the perceived importance of others to one's self-concept and social identity. As peer pressure amplifies the influence of social norms on the adoption of sustainable behavior, firms can create online social communities for further diffusion of the adoption of socially recognized and appreciated sustainable behaviors among customers. Value chains can promote customer education and awareness of the sustainability ramifications of the services they are using, with the idea of influencing customers' willingness and ability to engage in appropriate sustainable production behavior. One substantial barrier to reverse logistics is the customers' perception that it requires them to trade off quality standards, privacy, and customization of services to reduce resource use (Lam & Li, 2024). Even customers who have sustainable values and lifestyles are usually loath to make such a trade-off.

Customers' role in sustainability is growing, as advances of the social internet empower consumers and social communities to actively participate and massively collaborate in sustainable practices. A mushrooming customer segment rewards firms for their reverse logistics practices with loyalty, positive word-of-mouth, increased firm image, and repeat purchases (Sahaziz, Melewar & Alnassar, 2022). The challenge (but also opportunity) for firms is to meet these customer demands and to manage the customer involvement in operations without compromising quality and by simultaneously meeting the firms' financial and strategic objectives. One well-documented issue is that customer's usually associate sustainability with sacrifices of comfort, time, or money, and so the customers' acceptance of these trade-offs is a prerequisite to achieving sustainability (Lam & Li, 2024). Hence, successful reverse logistics requires customers' cooperation and partnership. Firms should also aim to manage customer behavior in the value chain, for example, by rewarding behavior that supports sustainable production, while discouraging behavior that interferes with sustainability. To achieve this, the firms can use instrumental

mechanisms such as providing financial awards to customers who adopt sustainable value chain practices or normative controls such as peer recognition of customers' good behavior.

Zaloga, Malawska & Bartoszewicz (2023) found the following influences in a consumer's decision to buy a sustainable product or service: consumers' needs, values, attitudes, lifestyle, learning, social learning, social influences, norms, environmental citizenship values, ability to learn about and adopt sustainable products, and cognitive load of the decision process; the costs of the buying process; disbelief of sustainable claims; and lack of information. The gap between attitude and behavior has drawn considerable attention, because although customers claim to prefer sustainable products and services, many do not actually buy or use them. Customers' purchase decisions and behavior are also encouraged by the creation and publication of lists or guides of sustainable services and the adoption of labeling systems, because when services, products, and firms get listed or accredited by a sustainable scheme, customers have to invest less in searching and evaluation costs for identifying and selecting a sustainable product. The internet is also valuable for developing and promoting practices aiming to change the customers' purchase behavior (Sahaziz, Melewar & Alnassar, 2022).

To encourage customers' green consumption decisions, firms need to adopt value chain practices that promote sustainable products and services. Biswas and Roy (2022) summarized such practices as follows: behavior reinforcement by using tangible rewards and penalties such as price discounts and intrinsic rewards such as become or emulate a role model; demarketing (reducing demand), remarketing (promotion of recycled products), and other societal marketing strategies promoting sustainable lifestyles; mandates and consumption limits created in partnership with policy makers and customer education and provision of information for creating a sense of caring for self, the community, and the environment. They also suggested that these efforts should primarily focus on developing customers' mindful consumption mind-set. This is because attitudes, values, and expectations influence the choice of consumption as well as determine how the effects from consumption are interpreted, thereby increasing or decreasing the likelihood of further consumption. Value chains can, for example, encourage customers

to recycle and save energy while at home thus, their responsibility for influencing customers' behavior does not stop in the after sale (Lam & Li, 2024).

2.3.6 Value Chain Performance

Firms strive to ensure rapid delivery of goods and services compared to competitors by leveraging efficient and cohesive value chains. The interdependence among supply chain partners necessitates well-orchestrated logistics decisions- spanning modal selection, load planning, and routing- to maintain competitiveness. However, value chain management faces escalating complexities due to global reengineering, outsourcing, and trade liberalization. These dynamics, combined with heightened globalization, fierce competition, and elevated customer expectations, mean that firms must continuously optimize operations and manage value chain activities to survive and prosper (Jamaldin, 2021).

The competitive strategy paradigm Porter developed categorized the value chain operations into primary and secondary activities. The activities of inbound logistics, operations, outbound logistics, marketing and sales, and services were classified as primary activities (Zamora, 2016), while procurement, human resource management, infrastructure, and technology development were grouped as support activities as shown in Figure 2.2.

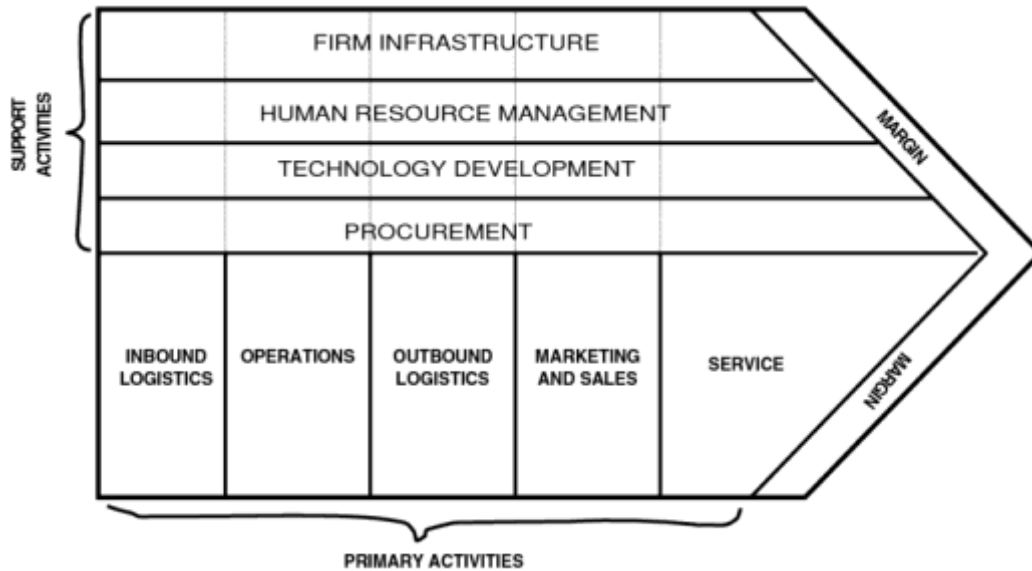


Figure 2.2: Michael Porters' Value Chain Model

Source: (Porter, 1985)

Interdependence amongst value chains is a key factor and thus success or failure of a firm depends highly on activities adopted by value chain partners. The need for value creation along these supply chains is important.

Critical factors to consider when analyzing performance of a value-chain include inputs, production, marketing, transportation and sale of the product. There are four performance measures used to assess the success of value chains in a firm. These are efficiency, degree of responsiveness flexibility and quality. Efficiency is the utilization of resources in the value chain. It is measured in terms of production costs, profit, return on investment and level of inventory; Degree of responsiveness is the speed/time spent in the fulfillment of a request. It is measured through fill rate, product lateness, customer response time, lead-time, shipping errors and customer complaints Flexibility is the ability of the value chain to adapt to a changing environment. It is measured through customer satisfaction and the flexibility in volume and lost sales. Quality consists of product and process quality. Product quality includes product safety and health, shelf-life, product reliability and

convenience while process quality consists of the characteristics of production and marketing systems (Mwari, 2019)

Value is measured by total revenue, a reflection of the price a firm's product commands and the units it can sell. A firm is profitable if the value it commands exceeds the costs involved in creating the product (Porter, 1985). Porter defined value as the amount buyers are willing to pay for what a firm provides, and he conceived the value chain as the combination of nine generic value added activities operating within a firm's activities that work together to provide value to customers. According to Porter (1985), Value chain analysis investigates the sequence of activities required to bring a product or service from conception and procurement through production and distribution to the final customer (Zamora, 2016). The analysis can be done for individual firms, for clusters of firms whose value chains are interlinked -referred to as value systems by Porter and usually involving suppliers, distributors, sellers and customers (Dubey, Gunasekaran, & Papadopoulos, 2020). Value configuration analysis is then linked to the analysis of the structural determinants of both industry attractiveness and alternative competitive strategies. The activities work together to provide value to customers (Porter, 1985). In Porter's Value Chain model, he linked up the value chains between firms to form what he called a Value System.

The primary focus in value chains is on the benefits that accrue to customers, the interdependent processes that generate value and the resulting demand and funds flows that are created (Porter, 1985). A move up the value chain through innovations is now viewed as a crucial strategy to firms' competitiveness (Zamora, 2016). This strategy is consistent with the general thesis that upgrading the value chain of a firm by producing better products, increasing business efficiency, and entering into more skill-intensive industries is a necessary and important strategy for ensuring sustainable competitive advantage. Encouraging higher value added activities and innovations have become central to strategies of various firms as well as various policies aimed at increasing Research and Development (Javanpour, Radman, Saeedi, Karimabadi, Larson, & Jones, 2025). Firms therefore need to clearly identify their value chains and aim to manage them to ensure that value is created in the present and future undertakings. Managing value

requires a fundamental change in the way organization and individuals think, take decisions and behave. The value added process affects the value chain relationship and consequently value chain performance. Kenya's manufacturing sector suffers from limited value addition and diversification, high cost of inputs and low competitiveness and yet this sector has a high potential in employment creation and poverty alleviation in the country (Mwaura, Letting, Ithinji, & Bula, 2015).

Firms seek to ensure that consumer needs are met beyond expectation and with this the need to determine value chain performance. Value chain performance is usually affected by value chain optimization. One of the most significant changes in modern business management is that businesses focusing on value chain optimization are no longer competing solely autonomous entities but as value chains. As competitive efforts are put in place, value chain management is key to ensuring organization goals are met. As much as value chain optimization affects value chain performance, it is important that organizations seek to adopt measures that best suit them (Javanpour, Radman, Saeedi, Karimabadi, Larson, & Jones, 2025). Therefore, value chain performance should be tracked regularly and measured transparently, and exceptions and unplanned events should be proactively identified and managed.

2.4 Empirical Review of Existing Literature

2.4.1 Recycling Practices

Globally, scholars have consistently documented the positive effects of recycling on value chain performance, with evidence spanning diverse industries such as manufacturing, retail, food and beverage, and electronics. Islam and Huda (2022), in their study of electronic waste recycling in emerging economies, found that recycling initiatives reduced operational costs while simultaneously improving the efficiency of resource utilization. Their findings suggest that firms that adopted structured recycling practices experienced not only economic benefits but also reduced risks associated with waste disposal and environmental compliance. This is particularly significant in industries with high waste

output, where inefficiencies in waste management can lead to both financial and reputational challenges.

In a similar vein, Singh, Gupta, and Sharma (2021) investigated recycling practices among Indian manufacturing firms and observed a direct link between recycling and enhanced competitiveness. They noted that firms that recycled scrap materials and by-products were able to cut production costs by as much as 20 percent, thereby gaining a competitive edge in pricing and profitability. Beyond cost savings, these firms also improved process efficiency and strengthened their supply chain resilience, as recycling reduced dependency on virgin raw materials whose availability was often subject to market fluctuations. Govindan and Hasanagic (2018) expanded on this perspective by arguing that recycling is not only an economic necessity but also a driver of social and environmental value. Their study revealed that recycling within value chains fosters stakeholder trust, enhances brand reputation, and reduces environmental liabilities. By embedding recycling into value chain processes, firms not only minimize environmental costs but also signal their commitment to sustainability, which in turn improves customer loyalty and long-term competitiveness.

The food and beverage industry provides further evidence of the link between recycling and value chain performance. Park, Nayak, and Zhang (2020) examined recycling practices in food packaging and found that recycling reduced procurement costs for packaging materials while simultaneously enhancing customer perceptions of sustainability. Their research highlighted that consumers increasingly prefer brands that demonstrate visible environmental stewardship, and recycling serves as a tangible practice through which firms can differentiate themselves in the marketplace. In this sense, recycling contributes to value chain performance not only through cost reduction but also by strengthening customer satisfaction and market positioning.

Recent evidence has also highlighted the role of recycling in building resilience within value chains. Tseng et al. (2021) demonstrated that recycling practices improve operational flexibility and reduce vulnerability to supply disruptions, particularly in industries reliant on scarce resources. For example, firms that recycled electronic

components or industrial metals were less exposed to price volatility in global commodity markets. Recycling thus contributes to supply chain stability, allowing firms to maintain consistent production and delivery schedules, which are critical indicators of value chain performance. Moreover, research by Choi and Hwang (2022) revealed that recycling enhances the circularity of supply chains, making them more adaptive to sustainability demands. By reintroducing waste materials into the production cycle, firms reduce the linear “take-make-dispose” approach and embrace a circular model that improves long-term performance. This aligns with broader global sustainability frameworks, such as the United Nations Sustainable Development Goals (SDGs), which emphasize responsible production and consumption.

In Africa, recycling practices are increasingly being recognized as critical for enhancing value chain performance, particularly in resource-intensive industries. Chanza and Musiyiwa (2022), in a study of agro-based industries in Southern Africa, found that recycling initiatives significantly improved supply chain coordination while reducing costs associated with raw material acquisition. By recycling agricultural by-products such as husks, shells, and wastewater, firms were able to generate additional revenue streams while minimizing environmental impacts. Their findings underscore the dual role of recycling in simultaneously improving environmental outcomes and economic performance. Adebajo and Ojo (2021) examined recycling practices among Nigerian small and medium enterprises (SMEs) and observed that firms that adopted recycling reported notable improvements in efficiency and competitiveness. Specifically, recycling reduced waste disposal costs, improved utilization of available resources, and enhanced organizational adaptability to environmental regulations. The study further highlighted that SMEs using recycling as a business strategy improved customer trust and developed new market opportunities, particularly in eco-conscious markets.

Similarly, Kambewa and Chikozho (2023) investigated recycling practices in Malawi’s plastics industry and concluded that recycling was integral to both cost reduction and innovation. Firms that recycled plastics not only lowered production costs but also developed new products from recycled materials, thereby expanding their product lines and increasing profitability. The study revealed that recycling fosters creativity in value

chains, where firms transform waste into opportunities for growth. These African studies collectively illustrate that recycling is increasingly being institutionalized as a strategic practice for value chain improvement. However, they also point out contextual challenges, such as limited infrastructure, weak regulatory enforcement, and inadequate consumer awareness, which constrain the full potential of recycling in enhancing value chain performance across the continent.

Kenya has witnessed a growing body of empirical research on the role of recycling in enhancing value chain performance, particularly in the manufacturing, retail, and agro-processing sectors. Kimani and Kariuki (2021), in their study of manufacturing firms in Nairobi, reported that recycling practices such as reusing industrial scrap, reprocessing defective products, and recycling packaging materials significantly reduced operational costs. Their findings revealed that recycling lowered dependency on virgin raw materials, thereby improving supply chain efficiency and profitability. Furthermore, the study emphasized that recycling reduced firms' vulnerability to global supply chain disruptions, as firms relied more on locally available recycled inputs. In the retail sector, Njoroge and Mutiso (2022) examined recycling practices in Nairobi-based supermarkets and found that recycling initiatives contributed to both operational and reputational performance. The introduction of recycling bins for plastics and paper not only helped retailers reduce waste management costs but also enhanced customer satisfaction, as consumers perceived supermarkets as environmentally responsible organizations. The study noted that customer loyalty was higher in supermarkets that visibly practiced recycling, suggesting that recycling indirectly contributes to value chain performance by strengthening customer relationships.

Otieno and Kihara (2023) studied recycling in Kenya's food and beverage industry and established that recycling significantly improved reverse logistics processes. Firms that recycled packaging and production waste minimized the costs associated with waste management while enhancing supply chain resilience. The study emphasized that recycling improved firms' ability to adapt to environmental regulations, such as the 2017 Kenyan ban on plastic bags, by encouraging innovations in sustainable packaging. As a

result, recycling not only strengthened operational efficiency but also enabled compliance with regulatory frameworks, thereby safeguarding long-term value chain performance.

In addition, Mwangi and Ngugi (2021) investigated recycling practices in Kenya's agro-processing cooperatives and reported that recycling agricultural by-products created additional income streams while reducing operational inefficiencies. For instance, cooperatives engaged in recycling coffee husks and sugarcane by-products into animal feed or bioenergy, thereby increasing overall organizational sustainability. The findings highlighted that recycling is not only a cost-saving mechanism but also an avenue for product diversification and market expansion. More recent studies in Kenya have also emphasized the role of recycling in aligning firms with sustainability expectations. Wekesa and Kariuki (2024), for example, found that firms practicing recycling were more likely to secure partnerships with global brands and international donors, as recycling demonstrated commitment to sustainability. This translated into improved value chain positioning and access to new markets, reinforcing the link between recycling practices and long-term competitiveness.

2.4.2 Reusing Practices

Globally, a growing body of empirical research has investigated the nexus between reusing practices and value chain performance, particularly within the context of sustainability, efficiency, and competitiveness. For instance, Kirchherr, Pohlner, & Charles (2022), in a multi-country analysis of manufacturing and retail firms across Europe, sought to determine how reuse strategies contribute to circular economy adoption and organizational competitiveness. Using a mixed-methods approach with survey data from 400 firms and regression modeling, they established that firms that actively promote product reuse—such as refurbishing, repurposing, and encouraging customers to extend product life—experience significant improvements in supply chain efficiency, resource optimization, and consumer loyalty. However, they identified a gap in the scalability of reuse models in developing markets where infrastructure is limited. Similarly, de Jong et al. (2021), studying electronics manufacturers in the Netherlands, employed case study design to analyze reuse interventions such as spare-parts recovery and reconditioning.

Their findings indicated that reuse not only reduces costs and waste but also enhances value chain resilience by lowering dependency on virgin raw materials. The contribution of these studies lies in showing that reuse practices are both economically and environmentally beneficial, although they emphasize the need for policy alignment to foster broader adoption.

In the global food industry, Molina-Besch and Pålsson (2023) conducted a study on packaging reuse within European supermarkets. Using a combination of observational studies and consumer surveys, they found that reusable packaging systems significantly improved value chain sustainability by cutting down logistics costs, reducing carbon emissions, and enhancing brand image. However, they noted resistance from consumers who perceived reusable options as less convenient compared to single-use packaging, highlighting a behavioral gap. Parallel research by Kazancoglu, Ozkan-Ozen, & Kumar (2022) in Turkey's textile sector demonstrated that reuse initiatives, such as fabric recovery and clothing resale, directly improved supply chain performance by reducing lead times and lowering production costs. Their structural equation modeling results confirmed that reuse strengthens inter-firm collaboration across the value chain, though they emphasized that a lack of technological capacity in emerging economies hinders optimal implementation. These global studies consistently suggest that reuse is a viable strategy to simultaneously achieve sustainability goals and operational efficiency, but they stress the importance of consumer acceptance and supportive infrastructure.

Regionally, within Sub-Saharan Africa, reuse practices have been increasingly recognized as a pathway to enhance value chain performance in industries facing resource scarcity. A study by Banga et al. (2021) on circular economy adoption in East African manufacturing firms revealed that companies integrating reuse practices—such as reusing industrial by-products, packaging, and production inputs—experienced reduced operational costs and improved competitiveness. The research, based on survey data from 150 firms across Kenya, Uganda, and Tanzania, employed econometric modeling and showed that firms adopting reuse strategies recorded up to 18% cost savings in material inputs. However, the study highlighted a gap in technological innovation and financing models that could allow firms to scale reuse practices effectively. Similarly, Okorie,

Salonitis, & Charnley (2022), analyzing the construction industry in Nigeria, conducted a mixed-methods study and found that reuse of construction materials such as cement, aggregates, and timber led to substantial improvements in project delivery times and supply chain resilience. Their findings suggest that reuse not only lowers environmental degradation but also creates secondary markets that benefit local economies.

Within the regional retail and food sector, Musoke and Nakyanzi (2021) studied supermarkets in Uganda to explore how reusable shopping bags and packaging systems influenced value chain dynamics. Through a survey of 300 consumers and interviews with retail managers, they observed that adoption of reusable packaging not only reduced logistics costs for retailers but also improved customer loyalty by signaling environmental responsibility. However, they noted that weak regulatory frameworks and consumer apathy towards sustainability limited large-scale adoption. Similarly, Njuguna and Wekesa (2022) in Tanzania investigated reuse practices within the beverage industry, particularly bottle-reuse systems. Their econometric analysis revealed that bottle reuse significantly improved supply chain performance by lowering production costs, reducing dependency on imports of new bottles, and improving product availability. Nonetheless, they highlighted logistical inefficiencies in collection systems as a major barrier. These regional studies underscore that reuse practices hold considerable promise for improving value chain efficiency and competitiveness, but institutional support and infrastructure development remain critical challenges.

Locally, in Kenya, empirical studies have also highlighted the positive relationship between reuse practices and value chain performance, particularly in the manufacturing, retail, and food and beverage industries. For example, Ndirangu and Mbugua (2021) conducted a survey among Nairobi-based SMEs in the plastics industry to examine the role of reuse in enhancing competitiveness. Using regression analysis, they established that firms implementing reuse practices, such as recycling and reusing plastic offcuts, significantly reduced production costs and enhanced supply chain collaboration. Their findings emphasized that reuse not only contributes to operational efficiency but also supports compliance with Kenya's regulatory frameworks, such as the plastic ban of 2017. Similarly, Mwangi and Chege (2022) studied the Kenyan beverage sector, focusing on

Coca-Cola's bottle reuse system. Through a case study approach involving interviews with supply chain managers and secondary data analysis, they established that bottle reuse improved supply chain sustainability, lowered production costs, and strengthened supplier relationships. However, logistical inefficiencies in collection systems and consumer reluctance to return bottles were highlighted as persistent challenges.

Further, Otieno and Wanjiku (2023) examined reuse practices in Kenyan retail chains, specifically supermarkets adopting reusable packaging initiatives. Using a mixed-methods approach with consumer surveys and retail manager interviews, they found that reuse practices positively influenced customer loyalty, reduced packaging costs, and enhanced brand competitiveness. However, the adoption rate was hindered by limited consumer awareness and lack of incentives to encourage reuse. Similarly, a study by Kimani et al. (2022) in Kenya's construction sector analyzed how material reuse influenced supply chain performance. Employing both quantitative surveys and qualitative interviews, they found that material reuse improved project delivery efficiency and reduced costs but faced barriers related to regulatory enforcement and inadequate waste management systems. Collectively, these Kenyan studies demonstrate that while reuse practices significantly improve value chain performance by reducing costs, improving resource efficiency, and strengthening customer relations, challenges such as weak infrastructure, limited consumer participation, and regulatory enforcement gaps continue to limit optimal implementation.

2.4.3 Remanufacturing Practices

A growing body of research has examined the link between remanufacturing practices and value chain performance, reflecting the increasing importance of circular economy principles in enhancing competitiveness and sustainability. For instance, Zhang and Chen (2021), in their study on the Chinese electronics sector, sought to determine how remanufacturing contributes to operational efficiency and customer satisfaction. Using a quantitative research design and survey data from 220 firms, the study employed structural equation modeling to test hypotheses relating to cost reduction and environmental performance. The findings revealed that remanufacturing substantially improved resource

efficiency by lowering production costs and enhancing product quality, which ultimately led to improved value chain performance. Importantly, the study highlighted that firms engaging in remanufacturing were better positioned to meet international environmental regulations and customer expectations for sustainable products. The research contributes to the literature by emphasizing the need for strategic alignment between remanufacturing and broader supply chain goals.

Similarly, Govindan and Hasanagic (2022) conducted research in the European automotive industry to assess the impact of remanufacturing on supply chain resilience and profitability. Their mixed-method design combined case studies and surveys across 80 firms to understand the drivers of remanufacturing adoption. The study found that remanufacturing not only minimized waste but also reduced supply risks associated with raw material shortages, leading to enhanced resilience and profitability within the value chain. However, the research identified gaps in standardization practices, as many firms lacked harmonized processes to scale remanufacturing effectively across global operations. Another important study by Saavedra, Rodrigues & Barquet (2023) in the Latin American manufacturing context explored the role of remanufacturing in creating sustainable business models. Using qualitative interviews with managers from 15 firms in Brazil and Mexico, the study established that remanufacturing practices provided opportunities for competitive differentiation while meeting the dual objectives of cost efficiency and environmental stewardship. The results suggested that companies integrating remanufacturing into their value chains reported improved customer loyalty and reputational gains. However, the study noted the challenge of weak regulatory frameworks and cultural barriers to adopting remanufactured products. This underscores the importance of regulatory incentives and awareness creation to boost consumer acceptance.

In regional contexts, particularly across Africa, remanufacturing practices are gaining traction but remain underexplored compared to other continents. Nnorom and Osibanjo (2021) studied remanufacturing and reverse logistics in Nigeria's electronics sector, aiming to understand their combined effect on value chain performance. Through surveys of 150 electronics SMEs, analyzed using regression analysis, the study found that

remanufacturing reduced electronic waste and generated new revenue streams, significantly improving the firms' operational and financial performance. However, the research revealed gaps in infrastructure and formal systems for collecting and processing used products, limiting scalability. This study contributes to understanding the potential for remanufacturing in African value chains while pointing to infrastructural and policy deficits that require redress.

Likewise, Mhlanga and Marnewick (2022) investigated remanufacturing practices in South Africa's mining equipment industry, focusing on how these practices influence value creation and supply chain competitiveness. The research employed a longitudinal case study design covering five large firms engaged in remanufacturing heavy-duty mining equipment. Findings indicated that remanufacturing significantly reduced downtime for mining operations, lowered capital expenditures on equipment, and enhanced overall supply chain performance. However, challenges related to skill shortages and the high upfront investment required for remanufacturing facilities constrained the sector's ability to scale these practices. The study highlights the role of skill development and public-private partnerships in strengthening the adoption of remanufacturing in Africa.

Within Kenya, empirical studies on remanufacturing remain limited but growing, reflecting the country's increasing embrace of circular economy models. Karanja and Wanjiku (2021) conducted a study on remanufacturing practices in Nairobi's automotive spare parts industry. Their research sought to establish the extent to which remanufacturing contributed to cost efficiency and market competitiveness. Using a descriptive research design with a sample of 90 firms, the study employed regression analysis to assess the relationship between remanufacturing and value chain outcomes. Results showed that firms practicing remanufacturing achieved substantial cost savings, increased product availability, and gained a competitive advantage in the spare parts market. The research highlighted the contribution of remanufacturing to reducing dependence on imported spare parts, thus strengthening local supply chains.

Similarly, Otieno and Mutiso (2022) investigated remanufacturing in the Kenyan electronics sector, with a focus on how it affects value chain sustainability. Using survey data from 120 electronics retailers and recyclers, the study applied correlation and regression analysis to determine the strength of the relationship. The findings revealed that remanufacturing enhanced supply chain sustainability by reducing e-waste and extending product life cycles. However, consumer skepticism toward remanufactured goods and lack of awareness about their benefits were identified as significant barriers. This points to the need for consumer education and policies that incentivize remanufacturing adoption in the Kenyan context.

Most recently, Mwangi and Kamau (2023) explored remanufacturing practices within Kenya's food and beverage industry, aiming to determine their contribution to operational efficiency and environmental performance. Using a mixed-method approach with both surveys and interviews, the study found that firms adopting remanufacturing of packaging materials and equipment parts reported improvements in cost efficiency and environmental compliance. These practices enhanced value chain resilience by ensuring the continued availability of critical inputs. However, the study identified a lack of government policy frameworks specifically supporting remanufacturing in the food sector as a limitation. This research contributes to literature by pointing to the untapped potential of remanufacturing in Kenyan industries beyond automotive and electronics.

2.4.4 Product Returns

Ketzenberg, Abbey, Heim & Kumar (2020) investigated consumer return behaviors and the operational consequences for retailers, with a focus on “wardrobing” and other forms of light-use returns that increase reverse-logistics costs. Using large retailer transaction datasets and analytical modeling, they quantified the share of returns that are unused versus partly used and showed how different policy responses (shorter windows, restocking fees, size-recommendation tools) affect return volumes and costs. Key findings were that a substantial proportion of online apparel returns are lightly used and that targeted policy and digital tools can materially reduce return rates and associated handling costs. The study contributes robust empirical estimates of return behavior and illuminates

concrete retailer levers to reduce returns, but it is less focused on downstream value-chain KPIs beyond direct reverse logistics cost impacts.

Van der Waaij (2024) examined product- and review-level predictors of returns in multi-category e-commerce platforms. The authors used large-scale transaction and review text data across multiple product categories and applied interpretable machine-learning models to predict which SKUs and customer segments are most likely to return items. Empirically, the study found that product attributes (fit, complexity, fragility), ambiguous product descriptions, and previous customer return history are strong predictors of returns; operationally, the authors show that improved product information and targeted interventions (size recommendation, image enhancements) reduce return incidence and the downstream reverse logistics burden. This paper's empirical strength is its use of granular transactional data and advanced predictive analytics; its gap is that it focuses on predicting returns rather than measuring the full value-chain performance effects of reduced returns (e.g., material recovery rates, secondary markets).

Namweseza, Ndandiko, Obanda and Mugurusi (2024) study on returns strategy and alignment assessed how retailers design return policies to balance customer experience and cost. Through mixed methods—surveying retail managers and analyzing operational data—authors identified strategic dimensions (policy generosity, speed of refunds, inspection rigor) that drive return volumes and processing costs. Empirical results show that tighter alignment of policy with product categories and distribution networks reduces processing times and lowers disposal/secondary-market losses, thereby improving chain-level cost efficiency. The contribution is practical guidance linking policy design to measurable reverse-flow cost outcomes; however, the study calls for longitudinal analyses to capture adaptation effects when firms change policies.

Ayoroh & Somba (2023) examined retail and informal resale channels. Empirical pilots in selected African cities tested grading and resale operations for returned apparel and electronics; results indicated that a well-managed grading operation increased the proportion of returns that re-entered the forward chain, boosting recovered revenue and reducing waste disposal costs. These studies combine operational KPIs (grading yield,

refurbishment time, resale margin) and consumer acceptance surveys, finding that trust in refurbished goods is a key demand-side limiter. The research gap remains standardized metrics and scalable governance models for integrating informal actors into formal grading/resale channels.

Kamanga et al. (2022) examined reverse logistics practices among large manufacturing firms and found that returns and reverse flows are material drivers of cost and process rework—especially where firms lacked formal returns policies and IT tracking. The studies used descriptive surveys of manufacturing firms, combined with inferential statistics, and reported that firms with structured returns policies and dedicated reverse channels experienced lower average processing time per return and lower disposal costs than firms treating returns ad hoc. The empirical contribution is a Kenyan-industry validation that policy and process standardization materially reduce reverse-flow costs; a gap noted is a lack of longitudinal firm-level before/after implementation data.

Kuno & Arani (2023) empirically tested reverse logistics and performance relationships and found that proactive returns and container take-back programs improved material recovery and reduced net procurement costs for secondary inputs. Using cross-sectional survey data and regression analysis, the paper showed statistically significant relationships between take-back intensity and firm performance measures (cost per unit, uptime). The study's limitation is its cross-sectional design; the authors recommend experimental pilots to capture dynamic effects as programs scale. For a company that accepts return as a strategy to gain customer loyalty through repeat buyers, reverse logistics is a fundamental process to recover re-usable for gaining additional revenue which inherently reduces cost of goods. Other than completing the supply chain loop so that products are handled at the benefit of environment, it is also important that products are recovered to cater to demand of after sales services so that cost of purchasing parts can be minimized (Fuerst, 2025).

2.4.5 Consumer Involvement

As consumers' concerns about the sustainability of firms and products have escalated, researchers have begun to study sustainability from a value chain management and multi-

stakeholder approach. This line of research considers the effect of customers on value chain management, and, further, examines how businesses can engage their customers to make their operations more sustainable. Moreover, advances of the social internet further empower customers and their social communities to participate in the design and operations of sustainable service systems by becoming co-designers, co-producers, and co-marketers of those services. Irrespective of the level of customer involvement, the customer presence affects implementation of reverse logistics practices. For instance, in order to increase recycling, consumers have to actively separate their waste (Le Thi Tuyet, Do Phuong, Hoang, & Nguyen 2024). Hence, the customers' values, lifestyles, ideologies, purchasing decisions, and behaviors can significantly influence the adoption and success of the reverse logistics practices in organizations and their value chains.

Oliver (2014) stated that customer satisfaction is the consumer's fulfilment response. It is the customer's evaluation of a product or service for determining whether that product or service has met the customer's needs and expectations. If the product or service has met the customer's needs and expectations, it will be assumed to result in satisfaction with the product or service. Customer involvement in reverse logistics processes is key in ensuring customer satisfaction of a product is achieved. This is because consumer involvement has been found to help improve businesses due to increased satisfaction in the products or services. However, satisfaction is dynamic; it may evolve and affected by a variety of factors such as the perception of service quality, product quality, and price as well as personal factors and situational factors).

According to Khan, Liang, & Shahzad (2015), the factor of price, product information, convenience and return policy have a positive and significant influence on customer involvement to repurchase in various stores. Moreover, the product return experience can influence customer perception of the service they receive. When customers are not satisfied by the product use due to the fact that the product did not meet their needs and expectations, the product will be returned. Hence, online retailers should ensure that product returns form part of their service recovery portfolio. Service recovery is essential for handling service failure and could include the reverse logistics practices of recycling, remanufacturing and reuse of the products. A customer who experiences service failure

might be more loyal to the retailer and repurchase if they are satisfied with the service recovery taken by the online retailer. The return policy can also assist online retailers in handling customer complaints. Provision of an acceptable return policy can be used to influence customer satisfaction and generate customer loyalty.

2.4.6 Value Chain Performance in the Food and Beverage Industry

According to Mwari (2019), Value Chain Analysis (VCA) is a three-phase procedure encompassing the following steps: initial Activity Analysis of the value chain, involving the identification of activities contributing to the delivery of services or products that constitute a crucial part of the overall customer experience. Typically depicted as a series of interconnected value chain boxes through arrows, representing the flows of tangible and intangible goods and services, this structure plays a pivotal role in mapping the value added at distinct chain stages. Additionally, it facilitates the incorporation of information specifically pertinent to the researcher's interests. The second step involves a meticulous examination of each identified activity, requiring ongoing and concentrated contemplation to pinpoint the value factors. These factors represent aspects highly valued by the customer in relation to how each activity is executed. For instance, this may encompass providing a prompt, accurate, and knowledgeable response to customer queries over the phone. The third and final step necessitates an assessment of the feasibility of implementing changes, followed by strategic planning for action. This phase involves translating the generated ideas into practical initiatives. Essential to this process is obtaining customer feedback during the implementation of changes, critically determining and affirming the accuracy of the devised plan in meeting customer needs. Concurrently, the mitigation of environmental impacts presents commercial opportunities, such as product differentiation, efficient resource utilization, creation of new revenue streams, and enhancement of stakeholder relationships. Consequently, some companies have adopted a proactive approach at the chain level, engaging in communication and collaboration initiatives to reduce their environmental footprint (Mwari, 2019).

Brennan and Rakhmatullin (2015) conducted a study in the United Kingdom, revealing that the value chain comprehensively outlines the diverse activities undertaken by firms

to usher a product from its inception through its entire lifecycle and beyond. This encompassing process spans activities such as design, production, marketing, distribution, and ongoing support provided to the ultimate consumer. These activities can either be confined within a singular firm or distributed among multiple entities. The components of a value chain have the capacity to generate either goods or services and may be concentrated within a specific geographic location or dispersed across broader regions. In Nigeria, Kehinde (2025) conducted a rigorous empirical study in Ogun State's spirits and wine manufacturing industry to explore how adopting cost-leadership and differentiation strategies influences organizational performance. Using cross-sectional survey data from 54 managers and employing regression analysis, the study found that firms embracing a differentiation strategy, akin to applying value chain insights to identify sources of uniqueness, attained significantly higher operational efficiency, profitability, market share, product quality, and customer satisfaction compared to those relying solely on cost leadership. These findings reaffirm the critical role of value chain-oriented strategic management in fostering competitive advantage and enhancing overall firm performance, much like the earlier work of Akenbor and Okoye (2011), but with more recent, industry-specific evidence in Nigeria.

In Kenya, Panya and Marendi (2021) examined how reverse logistics practices—specifically product recalls, returns, reuse, recycling, remanufacturing, and repackaging—affect performance in Fast-Moving Consumer Goods (FMCG) companies. Using a descriptive, cross-sectional approach with desk-based data from peer-reviewed studies and industry reports, they found that reverse logistics practices overall have a significant positive effect on organizational performance. Notably, product recalls and returns, and importantly, reuse initiatives—were particularly impactful in enhancing operational efficiency, cost savings, and market competitiveness, aligning with the general implications of Muttimos' earlier model. While each individual practice did not stand out alone, their collective adoption created synergistic performance benefits, indicating that integrated reverse logistics pathways drive stronger organizational outcomes. This more recent evidence reaffirms the strategic value of cumulative reverse logistics practices in bolstering financial and operational performance in Kenya's manufacturing firms.

Furthermore, Afum and Zhao (2019) explored the impact of various reverse logistics practices on the market performance of manufacturing firms, employing ordered probit regression models. Their analysis revealed that the adoption of reuse and remanufacture reverse logistics practices exerted a positive influence on market performance. Conversely, the adoption of recycling reverse logistics practices exhibited an initial negative impact. The model suggested that the collective adoption of reuse, remanufacture, and recycling reverse logistics practices contributed to an accumulated probability of positively influencing unaccounted factors, ultimately resulting in a net positive impact on the market performance of manufacturing firms. In conclusion, the model proposed that an enhancement in the market performance of manufacturing firms would likely be associated with an increased adoption of remanufacture and recycling reverse logistics practices. This underscores the strategic significance of these specific reverse logistics approaches in contributing to improved market outcomes for manufacturing firms, providing valuable insights for organizational decision-making and performance optimization.

2.5 Critique of Existing Literature

In the study on reverse logistics and competitive advantage within the context of water bottling companies in Nairobi, Ongombe (2012) established a robust connection between reverse logistics practices and gaining a competitive edge. The primary reverse logistics activities undertaken by water bottling companies, as identified in the study, included the return of defective products, screening, refurbishing, reuse, recycling, and remanufacture. Notably, the research highlighted the significance of maintaining positive relationships with stakeholders to ensure the seamless execution of reverse logistics activities. However, it is essential to note that Ongombe's study predominantly focused on the relationship between reverse logistics and competitive advantage, omitting an examination of operational performance. Additionally, the research lacked the incorporation of any moderating variables representing external factors that could influence the observed relationships. While providing valuable insights into the competitive aspects of reverse logistics in the water bottling industry, further exploration into operational performance and the inclusion of moderating variables would contribute

to a more comprehensive understanding of the dynamics involved in reverse logistics practices.

In his study on reverse logistics practices and profitability within the domain of large-scale manufacturing firms in Nairobi, Wainaina (2014) arrived at the conclusion that the adoption of reverse logistics among these firms was notably low. This low adoption was attributed to a lack of awareness or knowledge regarding reverse logistics practices. The research also highlighted that, despite the prevalence of using landfills for material disposal, many manufacturing firms in the region failed to capitalize on the substantial amounts of energy released from landfill gases. It is important to note that Wainaina's study primarily focused on the adoption of reverse logistics practices and their association with profitability, neglecting an examination of their broader effects on value chain performance. While shedding light on the challenges and opportunities related to reverse logistics adoption and its impact on profitability, a more comprehensive understanding of the influence of these practices on the overall value chain performance would provide a more nuanced perspective for manufacturing firms in Nairobi and beyond.

In Kiberenge's (2014) study on the adoption of reverse logistics within information and communications technology (ICT) firms in Kenya, it was observed that many operators in the ICT sector had embraced reverse logistics to a considerable extent, recognizing its significance for their operational processes. The research identified several barriers to the effective adoption of reverse logistics practices in this context, including inadequate financial resources, insufficient human capital, suboptimal collaboration between supply chain partners, deficient IT infrastructure, and variations in company size. Furthermore, the study highlighted key drivers behind the adoption of reverse logistics in ICT firms. These drivers included government support, resource allocation, the quality of returned products, and the measurement of reverse logistics performance. However, it is noteworthy that Kiberenge's research did not delve into aspects of operational performance. While providing valuable insights into the adoption, barriers, and drivers of reverse logistics in the ICT sector, an exploration of its impact on operational performance would contribute to a more comprehensive understanding of its implications for the industry.

Kaberger and Richu (2015) investigated the effect of reverse logistics on operational performance of sisal processing firms in Nakuru County. They found that product reuse has statistically significant positive effect on operational performance of sisal processing firms, due to reused products being more affordable than newly produced materials thereby creating cost-advantage to the organization. Secondly, product reuse minimizes time it takes to acquire materials thereby enhancing efficiency in the processing operations. However, their study only focused on two reverse logistics practices which were reuse and product recovery.

Muttimos (2014) conducted a similar study to Wainaina (2014) though his study did not only focus on profitability but the link between reverse logistics and organizational performance as a whole. In his study, he actually found that the level of adoption of reverse logistics in manufacturing firms in Kenya was of more appreciable levels. His findings also revealed that recycling and reuse has a negative effect on organizational performance while remanufacturing improved the quality of the organizational performance. Like the others, his study did not address any moderating variable which is an external factor.

Reverse logistics practices is one of the ways in which manufacturing firms can use to increase their profitability through making maximum use of their waste products and materials to produce value added goods and services at a reduced cost which in return will lead to improved customer satisfaction.

2.6 Research Gaps

Studies such as Ongombe (2012), Serut (2013), Wainanina (2014) and Odhiambo (2014) have all concentrated on the reverse logistics practices and the green logistics practices and how it affects performance and they have concentrated on factors such as product reuse, recycling, eco-design, green purchasing, responsive packaging, product returns and other factors for example how organizational culture and availability of resources affect the adoption of reverse logistics in any organization. Studies by Ongombe (2012), Wainaina (2014), Kiberenge (2014) and Muttimos (2014) focused on profitability or

aspects of organizational performance and not value chain performance. While Kabergey and Richu (2015) brought out the link between reverse logistics and operational performance, they only studied product reuse and recovery among the reverse logistics practices.

Khan, Liang, & Shahzad (2015) in their study discovered that the factor of price, product information, convenience and return policy have a positive and significant influence on customer involvement to repurchase in various stores in China. In Kenya studies incorporating consumer involvement especially with a focus on reverse logistics are unavailable therefore creating a gap for study. From the empirical review, it can be noted that most studies on reverse logistics in Kenya occurred between the years 2012 to current showing that the level of interest in reverse logistics has only increased recently. Most of the studies have focused on adoption of reverse logistics on organizational performance, financial performance, operational performance, marketing performance and competitive advantage but none of the study has focused on the role of reverse logistics practices on value chain performance.

2.7 Summary of the Reviewed Literature

Reverse logistics includes all activities in reverse logistics in the reverse flow from the point of consumption to the point of origin for the purpose of recapturing value or proper disposal. Reverse logistics activities include; returning returned products to suppliers, reselling product, salvaging the product, reconditioning or repairing the product, refurbishing the product, remanufacturing, reclaiming materials, recycling, reusing and landfill disposal. Reverse flows may arise from supply chain partners due to balancing of stock, marketing activity oriented returns, obsolete, end of season or life cycle returns and returns due to damage in transit while they may arise from end users as a result of defects, products not wanted, returns under warranty, returns due to recalls and returns due to environmental and difficulty of disposal concerns. Reverse logistics can be used to enhance the organization's customer service capabilities by communicating and convincing the market place concerning the capabilities of the organization to create and preserve value for their products. In conclusion, for manufacturing firms to implement the

above reverse logistics practices, they would need to set up waste collection mechanisms, warehouses, disassembly or recycle plants and final treatment or landfill areas for final disposal. This implementation if done correctly saves on the cost of operations of the organization.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter highlighted a discussion of the research design, sources of data, population, sample and sampling techniques, tools and procedures of data collection and methods of data analysis that were used to answer the research hypotheses.

3.2 Research Design

This is the outline, plan or scheme that is used to generate answers to a research problem. This study adopted a descriptive research design as it is more investigative and focuses on a particular variable factor (Ott & Longnecker, 2010). It describes what is in existence in respect to conditions or variables that are found in a given situation. In this study data was collected to show the role of reverse logistics practices on value chain performance in the food and beverage industry in Kenya.

3.2.1 Research Philosophy

Research philosophy outlines the way data of a certain phenomenon should be compiled and analyzed (Larkin, Shaw & Flowers, 2019). It is a comprehensive term that denotes the development of knowledge and the nature of that knowledge. This research adopted a positivism research philosophy. Positivism is a research philosophy that is based on the idea that knowledge should be derived from observable and measurable facts. It emphasizes objectivity, scientific methods, and quantifiable evidence (Creswell & Creswell, 2018). Under positivism, reality is viewed as stable and independent of the researcher, meaning it can be studied without bias. Researchers who adopt this philosophy focus on cause-and-effect relationships and rely on structured methodologies such as statistical models to test hypotheses (Saunders, Lewis, & Thornhill, 2019). In this research, positivism is particularly useful because it allows the researcher to measure the

reverse logistics practices and link them to value chain performance outcomes such as cost reduction, efficiency, and customer satisfaction (Mensah, Mahmood & Mensah, 2022).

3.3 Target Population

Ott and Longnecker, (2010) define the target population as the complete collection of objects whose description is the major goal of the study. According to the Manufacturers and Exporters Directory (2022) data, the total number of companies in the food and beverage industry is 291 but the target population for the study is 90 companies in the food and beverage industry which have implemented the reverse logistics practices in their organizations and value chains.

3.4 Sampling Frame

A sampling frame is the source material or device from which a sample is drawn, it is a list of all those within a population who can be sampled (Mugenda & Mugenda, 2003).

Table 3.1: Sampling Frame and Sample Size

	Target Population	Sample Size
Operations Officers	90	74

Source: (Researcher, 2022)

3.5 Sample Size and Sampling Techniques

A sample size refers to the number of items to be selected from the universe (population) to constitute a sample (Kothari, 2014). The sample size depends on what one wants to know, the purpose of the inquiry, what is at stake, what is useful, what has credibility and what can be done within the available time and resources. The researcher applied the statistical formula by Yamane (1967) in order to derive the sample size. The formula is:

$$n = \frac{N}{1 + N(e)^2}$$

Where:

n=sample size

N=total population

1=constant

e=error term (0.1)

N=90, e=0.05

N = 90, e=0.05

$$n = \frac{90}{1 + 90(0.05)^2}$$

$$n = \frac{90}{1.225}$$

$$= 73.47$$

This gave a sample size of 74 organizations in the Food and Beverage industry. Purposive sampling was used to select the 74 organizations under consideration in this study. Kothari (2014) states that under purposive sampling, the researchers deliberately choose the units of study to constitute the sample on the basis that the small mass they select out of the huge one will be a typical representative of the whole. For instance, in this study, not all organizations in the food and beverage industry can conduct reverse logistics as some products such as food waste, food-tainted items (such as: used paper plates or boxes, paper towels, or paper napkins), plastic wrap, packing peanuts, bubble wrap and wax boxes which are used in packaging cannot be reused or recycled for the same or a similar purpose. Similarly, not all organizations in the food and beverage industry have implemented the reverse logistics process therefore only organizations that have implemented various aspects of reverse logistics were considered.

3.6 Data Collection Instrument

This research used structured questionnaires as a data collection instrument. Questionnaires were used since according to Cooper and Schindler (2014), they are effective data collection instruments that allow respondents to give much of their opinions

in regard to the research problem. Structured questionnaires provide standardized questions that ensure uniformity in responses across all participants, thereby minimizing researcher bias and enhancing the reliability of data (Saunders, Lewis, & Thornhill, 2019). This consistency allows for effective comparison and statistical generalization of findings to the broader population, which is critical for making inferences on the role of reverse logistics practices on value chain performance in the food and beverage industry in Kenya. Questions in the instruments were structured in a way that they address various aspects of the study variables. This method is more confidential, easier to administer and to analyse, economical and time saving as compared to the other instruments thus it was appropriate for this study. The researcher did a preliminary study where she contacted all the companies under study to find out whether they conduct any reverse logistics practices before administering the questionnaires to the respondents.

3.7 Data Collection Procedure

Creswell (2013) defined data collection as a means by which information is obtained from the selected subjects of an investigation. Data that has already been collected and documented is referred to as secondary data. Secondary data was collected from internationally accredited journals, books, reports and articles that contain information on academic research. This data was used to develop a solid background of knowledge for the topic under study. Primary data refers to the first-hand information received from a respondent. The researcher collected primary data through administration of questionnaires to the key informants who were the employees in the sample companies chosen. The researcher booked appointments with the organizations under study where they dropped the questionnaires and picked them up for analysis as discussed. The respondents were given two weeks to fill the questionnaires, and then the filled questionnaires were collected. Nonetheless, the duration was prolonged in instances where the respondents failed to return the filled questionnaire at the stipulated time. This method is convenient owing to the length of the questionnaire, the availability of the respondents and the geographical dispersion of the population (Farah, Munga & Mbebe, 2018). A link was also shared to facilitate ease in the data collection process especially due to the Covid 19 restrictions.

3.8 Pilot Test

According to Kothari (2014), a pilot test is a small-scale preliminary study done before the main research in order to measure validity and reliability of the data collection instruments. A pilot study was conducted to test the instrument's reliability and validity. A measure will be considered reliable if a person will score the same upon being given the same test twice. According to Mugenda (2003), a pre-test sample ranges from 1% to 10% depending on the sample size hence 10% of the pre-test sample was used and was not included in the final study. The pilot study was conducted from seven selected food and beverage organizations in Nairobi City County which formed 10% of the entire study population. The choice of Nairobi City County was informed by proximity and accessibility by the researcher and the location of many food and beverage firms. These firms were purposively selected because they represent key players in the local food and beverage industry and have well-established supply chain operations, including reverse logistics processes. Selecting these firms allowed for the testing of research instruments under conditions that are similar to the main study population, ensuring that the questionnaire was clear, relevant, and capable of capturing the intended data. These firms were chosen due to their accessibility and willingness to participate, which facilitated timely data collection and provided practical insights into potential challenges in administering the main study. The pilot data collected was analyzed to determine how much time is taken on each questionnaire, and decide whether the instruments should be revised for length. The pilot test also tested the data for relevance, interpretability and usefulness in addressing the study objectives. Finally, the responses drawn from the pilot study were used for establishing more efficient and practical ways of administering them.

3.8.1 Validity of the Instrument

According to Cooper and Schindler (2014), validity determines whether the research instrument truly measures that which it is intended to measure or how truthful the research results are and whether or not the questionnaire actually elicits the intended information. Questionnaire items are valid if they are successful in eliciting true responses relevant to the information desired. If the response is to be valid, it is essential that the respondent

understands the question as it is understood by those conducting the study, also the respondent must be able to respond; he or she must have the information. If the respondent does not have the information, a "neutral" category could still make the question valid.

To measure the validity of the contents of research instrument to be used in this research, the researcher used experts in this field to assess the content, construct and face validity of the questions in the questionnaire and whether they are valid to the study. Content validity assesses whether a test is representative of all aspects of the construct. To produce valid results, the content of a test, survey or measurement method must cover all relevant parts of the subject it aims to measure (Cooper & Schindler, 2014), construct validity the degree to which scores are accounted for, by explanatory constructs of a model or theory. Face validity is a non-statistical method of validation used to source for opinions on whether the testing instrument can/will measure what it's meant to measure. The questionnaire was administered to two experts and the supervisors, in order to check whether the instrument is in-line with the research topic and to enhance clarity and to avoid ambiguity. Necessary amendments were made based on the corrections suggested by the reviewers.

3.8.2 Reliability of the Instrument

The reliability of a measure denotes the consistency of results obtained in the use of a particular instrument and is an indication of the extent of random error in the measurement method (Creswell, 2013). To ensure reliability of measurement in relation to the consistency, accuracy, and precision of the measures to be taken in the use of the research instrument and to ensure that there was no bias during the study, Cronbach's alpha method was used to measure the consistency of the questions in the questionnaire. The Cronbach's alpha coefficient should range between 0 and 1. Higher alpha coefficient values means that scales are more reliable. Acceptable alpha should be at-least 0.70 or above.

3.9 Data Analysis and Presentation

Data analysis is a systematic process of transcribing, collating, editing, coding and reporting the data in a manner that makes it sensible and accessible to the reader and

researcher for the purposes of interpretation and discussion (Mugenda & Mugenda, 2003). The data analysis methods that were employed are quantitative. Quantitative data was analyzed using descriptive and inferential statistical methods and tools. Data was coded in SPSS version 24 and analysed using descriptive and inferential statistics. In descriptive analysis the study used mean and standard deviation. Quantitative data was computed for inferential statistics where ANOVA test was used to indicate the level of variation on value chain performance which is attributed to product returns, recycling, reusing and remanufacturing. The significance was measured in percentage, analysis of variance was used because it makes the use of F-test in terms of squares and residual. The F-test was done to test the significance of each independent variable at a confidence level of 95%.

Multiple regression models were used to find out the relationship between the independent variables (Recycling, Reusing, Remanufacturing and Product Returns) and the dependent variable (Value Chain Performance) moderated by Consumer Involvement. The findings of the data were subjected to Pearson's correlation coefficient analysis to determine whether any relationship exists between independent variables and the dependent variable and the strength of the relationship between the variables were established (Creswell, 2013).

Simple linear model;

$$Y = \beta_0 + \beta_1 X_1 + \epsilon$$

Simple linear model with moderator

$$Y = \beta_0 + \beta_1 X_1 * Z + \epsilon$$

The regression model before moderation was as follows;

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \epsilon$$

The regression model after moderation was as follows:

$$Y = Y = \beta_0 + \beta_1 X_1 * Z + \beta_2 X_2 * Z + \beta_3 X_3 * Z + \beta_4 X_4 * Z + \epsilon$$

Where:

Y= Value Chain Performance in the Food and Beverage Industry in Kenya

β_0 = Constant

X_1 = Recycling Practices

X_2 = Reusing Practices

X_3 = Remanufacturing Practices

X_4 = Product returns

Z = Consumer involvement

e = error term

$\beta_1, \beta_2, \beta_3, \beta_4$ = Model coefficients which are to be estimated

3.10 Operationalization of Study Variables

Table 3.2: Operationalization of Study Variables

Type of Variable	Variable	Indicators	Scale
Independent Variable	Recycling Practices	Recycling Policy	Ordinal
		Resource Efficiency	
		Regulatory compliance	
		Waste Sorting	
	Reusing Practices	Packaging Reuse	Ordinal
		Lifestyle Extension	
		Tracking systems	
		Waste Minimization	
	Remanufacturing Practices	Remanufacturing Facilities	Ordinal
		Technology Investment	
		Defective Recovery	
		Product Types	
	Product Returns Practices	Remanufactured	Ordinal
		Returns Policy	
		Process efficiency	
		Tracking System	
Moderating Variable	Consumer Involvement	Returns Volume	Ordinal
		Products retrieval	
		Engagement Level	
		Creates Awareness	
Dependent variable	Value Chain performance	Participation Rate	Ordinal
		Efficiency	
		Quality	
		Customer Satisfaction	
		Flexibility	

CHAPTER FOUR

RESEARCH FINDINGS AND DISCUSSIONS

4.1 Introduction

This chapter covers data analysis, presentation and interpretation of the results of the study. The study focused on the role of reverse logistics practices on value chain performance in the food and beverage industry in Kenya. The specific objectives of the study included recycling, reusing, remanufacturing and product returns while the moderating variable was consumer involvement. Data was analyzed and the results were interpreted and presented in tables and graphs.

4.2 Pilot Study Results

Kothari (2014) stated that a pilot test is a small-scale preliminary study done before the main research in order to measure validity and reliability of the data collection instruments. A pilot study was conducted to test the instrument's reliability and validity. A measure was considered reliable if a person scored the same upon being given the same test twice. According to Mugenda (2003), a pre-test sample ranges from 1% to 10% depending on the sample size hence 10% of the pre-test sample was used and was not included in the final study. The study used 7 organizations in the food and beverage sector to conduct the pilot study of which these were not part of the sampled population. This represented 10% of the accessible population. The respondents who participated in the pilot testing of the research instruments were exempted from being respondents in the main study to eliminate biasness in the research results based on prior knowledge of the contents in the research instrument.

4.2.1 Reliability Analysis

The reliability of a measure denotes the consistency of results obtained in the use of a particular instrument and is an indication of the extent of random error in the measurement method (Kothari, 2014). To ensure reliability of measurement in relation to the

consistency, accuracy, and precision of the measures to be taken in the use of the research instrument and to ensure that there was no bias during the study, Cronbach's alpha method was used to measure the consistency of the questions in the questionnaire. It ranges between 0 and 1 and acceptable alpha should be at least 0.70 (Mugenda & Mugenda, 2003). Table 4.1 shows the output from the reliability of statements measuring each individual variable.

Table 4.1: Reliability Statistics

Independent/ Dependent Variables	Number of Items	Cronbach's Alpha value	Comment
Recycling Practices	5	0.764	Reliable
Reusing Practices	6	0.922	Reliable
Remanufacturing Practices	6	0.878	Reliable
Product Returns	6	0.742	Reliable
Consumer Involvement	6	0.916	Reliable
Value Chain Performance	19	0.926	Reliable

4.2.2 Validity Analysis

According to Cooper and Schindler (2014), validity determines whether the research instrument truly measures that which it is intended to measure or how truthful the research results are and whether or not the questionnaire actually elicits the intended information. Questionnaire items are valid if they are successful in eliciting true responses relevant to the information desired. If the response is to be valid, it is essential that the respondent understands the question as it is understood by those conducting the study, also the respondent must be able to respond; he or she must have the information. If the respondent does not have the information, a "neutral" category could still make the question valid. To measure the validity of the contents of research instrument to be used in this research, the researcher used experts in this field to assess the content, construct and face validity of the questions in the questionnaire and whether they are valid to the study.

Sampling adequacy test was done to test the relevance and suitability of the factors. Kaiser-Meyer Olin Measure (KMO) of sampling adequacy and Bartlett's Test of Sphericity were used to establish data's sampling adequacy. The KMO measures of

sampling adequacy produced a value of 0.679 while Bartlett’s test of sphericity had a consistent significance of $p < .000$ which confirmed sampling adequacy. Bartlett’s test of sphericity had a chi-square value of 94.325 with a p-value of 0.000. Table 4.2 presents the results of the sampling adequacy test.

Table 4.2: KMO and Barlett's Test

Kaiser-Meyer-Olin Measure of Sampling Adequacy.		0.679
	Approx. Chi Square	94.325
Bartlett’s Test of Sphericity	df	24
	Sig.	.000

4.3 Instrument Response Rate

Response rate refers to the extent to which the final data sets includes all sample members and is calculated as the number of respondents with whom interviews are completed (Kothari, 2014). The researcher distributed 74 questionnaires and 72 questionnaires were completed by the respondents representing a 97% return rate as shown in Table 4.3.

Table 4.3: Instrument Response Rate

	Frequency	Percent
Operations Officers	72	97%

4.4 Descriptive Statistics

Descriptive statistics enable the researcher to describe the distribution of measurements using statistics. The statistics used depends on the variables in the study and the measurements used. The researcher used measures of central tendency to present the study findings. The general objective of this study was to establish the role of reverse logistics practices on value chain performance in the food and beverage industry in Kenya while the specific objectives observed were recycling, reusing, remanufacturing and product returns moderated by consumer involvement.

4.4.1 Recycling Practices

This study sought to establish the role of recycling practices on value chain performance in the food and beverage industry in Kenya. The respondents were questioned on various indicators of recycling practices on value chain performance. Their responses were rated on a 5 points Likert scale in which they either stated strongly disagree, disagree, neutral, agree and strongly agree. The results were expressed in percentages as shown in Table 4.4

Table 4.4: Measurement of Recycling Practices

Statement	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)	Mean	Standard Deviation
Our organization has a recycling policy	1	21	14	39	25	3.65	1.12
Waste water is purified and reused in different operational systems	14	0	19	41	26	3.65	1.27
There is a decrease in utility usage during recycling i.e volume of power and water consumption	7	7	28	33	25	3.63	1.14
There is a reduction in emission and waste generation	1	13	24	46	17	3.64	0.95
Our organization is able to recycle and recover the value of more than half of the goods reversed by our clients	10	11	18	33	29	3.58	1.28

N=72

The respondents were asked whether they have a recycling policy in their organization (\bar{x} = 3.65, SD=1.12). 1% strongly disagreed that they have a recycling policy in their organization, 21% of the respondents disagreed that they have a recycling policy in their

organization. 14% of the respondents choose neutral as they did not know whether they have a recycling policy in their organization. 39% of the respondents agreed that they have a recycling policy and 25% of the respondents strongly agreed that they have a recycling policy in their organization. Water is very key in all the operations of an organization ($\bar{x}=3.65$, $SD=1.27$). 14% of the respondents indicated that their organization does not purify and reuse waste water during their operations, 19% of the respondents picked the neutral category while 41% of the respondents agreed that they reuse waste water in their processes and 26% of the respondents strongly agreed that they reuse purified waste water in their organization. 7% of the respondents strongly disagreed and disagreed that recycling practices decreases utility usage (volume of power and water consumption) ($\bar{x}=3.63$, $SD=1.14$), 28% of the respondents chose neutral as they did not know whether recycling decreases utility usage. Majority of the respondents (33% and 25%) agreed and strongly agreed respectively that recycling practices decrease utility usage in their organization.

The respondents were also asked whether recycling practices reduced their emissions and waste generation ($\bar{x}=3.64$, $SD=0.95$). 1% of the respondents strongly disagreed that recycling reduces emissions and waste generation, 13% of the respondents disagreed, 24% of the respondents chose the neutral category. Majority of the respondents (46%) agreed that recycling reduces their emissions and waste generation and 17% of the respondents strongly agreed. The respondents were also asked whether they are able to recycle and recover the value of more than half of the goods reversed by their clients ($\bar{x}=3.58$, $SD=1.28$). 10% of the respondents strongly disagreed, 11% of the respondents disagreed, 18% of the respondents picked the neutral category, 33% of the respondents agreed and 29% of the respondents strongly agreed that they are able to recover value from their products.

The study findings were supported by Panya *et al.* (2021), Mwaura *et al.* (2015), Mbovu & Mburu (2018) and Muttimos (2014) who found that recycling practices influence performance of an organization through decrease utility usage in the organization and waste generation and emissions in the organization thus showing effectiveness in the use of the organizational resources in a bid to ensure that the organization gets maximum

value from their products. This in turn adds value to their value chains and save on costs of the items.

4.4.2 Reusing Practices

The study sought to assess the influence of reusing practices on value chain performance in the food and beverage industry in Kenya. The respondents were questioned on various indicators of reusing practices on value chain performance. Their responses were rated on a 5 points Likert scale in which they either stated strongly disagree, disagree, neutral, agree and strongly agree. The results were expressed in percentages as shown in Table 4.5

Table 4.5: Measurement of Reusing Practices

Statement	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)	Mean	Standard Deviation
Our organization uses packaging materials that can be reused for other purposes	1	18	11	39	31	3.79	1.11
Our organization encourages distributors and customers to return used products for reuse.	3	15	15	38	29	3.75	1.12
We provide technical support to our distributors and agents to improve reusability of items	3	18	11	40	28	3.72	1.14
Our organization has a round trip system to ensure the return of items	1	21	7	40	31	3.78	1.14
The reuse of items in production decreases the cost of inventory	1	6	28	35	31	3.88	0.96
The organizations reuses items in a bid to be more competitive in the market	6	3	24	36	32	3.86	1.08

N=72

The respondents were asked whether their organization uses packaging that can be reused for other purposes (\bar{x} = 3.79, SD=1.11). 1% strongly disagreed to this, 18% disagreed, 11%

chose neutral, 39% of the respondents agreed and 31% of the respondents strongly agreed that they use reusable packages. Respondents were also asked whether their organization encourages distributors and customers to return used products for reuse ($\bar{x}= 3.75$, $SD=1.12$). 3% of the respondents strongly disagreed, 15% disagreed, 15% chose neutral, 38% of the respondents agreed and 29% of the respondents strongly agreed. Respondents were also asked if their organizations provided technical support to distributors and agents to improve reusability of items ($\bar{x}= 3.72$, $SD=1.14$). 3% of the respondents strongly disagreed, 18% of the respondents disagreed that they do not offer technical support, 11% of the respondents chose neutral, 40% of the respondents agreed that they offer technical support and 28% of the respondents strongly agreed. Respondents were also asked whether their organizations had a round trip system to ensure the return of materials ($\bar{x}= 3.78$, $SD=1.14$). 1% strongly disagreed, 21% disagreed, 7% chose neutral since they had no knowledge of this, 40% of the respondents agreed and 31% strongly agreed. The respondents were asked whether the reuse of items decreases the cost of inventory in their organization ($\bar{x}= 3.88$, $SD=0.96$). 1% strongly disagreed, 6% disagreed, 28% chose neutral, 35% agreed that reusing reduces the cost of inventory and 31% of the respondents strongly agreed. Finally, the respondents were asked whether they reuse items in their organization in order to remain competitive ($\bar{x}= 3.86$, $SD=1.08$). 6% of the respondents strongly disagreed, 3% of the respondents disagreed, 24% of the respondents chose neutral, 36% of the respondents agreed and 32% of the respondents strongly agreed.

In summary, the findings showed that reusing practices influenced value chain performance in the organization. This is supported by Panya *et al.* (2021) and Muttimos (2014) who found that organizations offer support to consumers to encourage reuse of their products which in turn leads to reduce the costs of inventory therefore increasing their competitive advantage over their competitors.

4.4.3 Remanufacturing Practices

The study sought to determine the role of remanufacturing practices on value chain performance in the food and beverage industry in Kenya. The respondents were questioned on various indicators of remanufacturing practices on value chain

performance. Their responses were rated on a 5 points Likert scale in which they either stated strongly disagree, disagree, neutral, agree and strongly agree. The results were expressed in percentages as shown in Table 4.6

Table 4.6: Measurement of Remanufacturing Practices

Statement	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)	Mean	Standard Deviation
Remanufacturing enhances our organization value chain	4	24	11	31	31	3.60	1.26
Remanufacturing helps our organization to reduce our production costs	3	26	6	31	35	3.68	1.28
Our company sales volumes have increased due to remanufacturing	0	24	8	33	35	3.79	1.16
Through successful remanufacturing our organization is able to raise our profit margins substantially	4	19	10	29	36	3.76	1.26
Our organization is able to produce a large variety of products in the market within a very short time	3	11	21	33	32	3.81	1.10
Remanufacturing increases our organizations competitiveness in the market	1	22	4	35	38	3.85	1.19

N=72

Respondents were asked whether remanufacturing enhances their value chain (\bar{x} = 3.60, SD=1.26). 4% of the respondents strongly disagreed, 24% disagreed, 11% chose neutral, 31% agreed and 31% strongly agreed. Respondents were also asked whether remanufacturing helps their organization to reduce their production costs (\bar{x} = 3.68, SD=1.28). 3% of the respondents strongly disagreed, 26% of the respondents disagreed, 6% chose neutral, 31% agreed and 35% strongly agreed that remanufacturing leads to decreased production costs. The respondents were also asked whether remanufacturing

has increased their company sales volumes (\bar{x} = 3.79, SD=1.16). 24% of the respondents disagreed, 8% chose neutral, 33% agreed that sales volumes have increased and 35% of the respondents strongly agreed. Respondents were asked whether remanufacturing has led to increased profit margins in their organization (\bar{x} = 3.76, SD=1.26). 4% of the respondents strongly disagreed, 19% of the respondents disagreed, 10% of the respondents chose neutral, 29% of the respondents agreed and 36% of the respondents strongly agreed. Respondents were also asked whether they are able to produce a large variety of products within a very short time due to remanufacturing (\bar{x} = 3.81, SD=1.10). 3% of the respondents strongly disagreed, 11% disagreed, 21% chose neutral, 33% agreed and 32% strongly agreed. Lastly, the respondents were asked whether remanufacturing increases their competitiveness in the market (\bar{x} = 3.85, SD=1.19). 1% of the respondents strongly disagreed, 22% of the respondents disagreed, 45% of the respondents chose neutral, 35% of the respondents agreed and 38% of the respondents strongly agreed.

The findings of this study indicated that remanufacturing influences value chain performance of an organization. This is shown by a majority of the respondents who agreed that remanufacturing enhances their value chains, reduces their production costs, increases their sales volumes, increases their profit margins and increases their competitiveness in the market and improving the performance of their value chains. In addition, the findings were supported by Kamanga *et al.* (2022) and Mogaka (2015) who found that remanufacturing is recognized for reducing production costs, increasing sales volumes, increasing profit margins and increasing competitiveness in the market.

4.4.4 Product Returns

The study sought to examine the influence of product return on value chain performance in the food and beverage industry in Kenya. The respondents were questioned on various indicators of product return practices on value chain performance. Their responses were rated on a 5 points Likert scale in which they either stated strongly disagree, disagree, neutral, agree and strongly agree. The results were expressed in percentages as shown in Table 4.7

Table 4.7: Measurement of Product Returns

Statement	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)	Mean	Standard Deviation
Our organization has a return policy that is favorable to the consumers	3	11	14	32	40	3.96	1.12
The product returns system is synced with the supply chain network	4	8	13	39	36	3.94	1.10
Product returns increase the level of customer satisfactions	0	14	22	31	33	3.83	1.05
We use a time based turnaround strategy to measure product returns performance	1	18	11	38	32	3.81	1.12
Our organization employs returns management to minimize wastage	3	10	13	31	44	4.04	1.11
We conduct regular capacity building on returns management to enhance productivity	3	18	36	28	15	3.35	1.04

N=72

In order for reverse logistics activities to be successful, products have to be returned efficiently to the organization. Respondents were asked whether their organization has a returns policy that is favorable to their consumers (\bar{x} = 3.96, SD=1.12). 3% of the respondents strongly disagreed, 11% of the respondents disagreed, 14% of the respondents chose neutral, 32% of the respondents agreed and 40% of the respondents strongly agreed. Respondents were further asked whether the returns process was synced within the supply chain (\bar{x} = 3.94, SD=1.10). 4% of the respondents strongly disagreed, 8% of the respondents disagreed, 13% of the respondents chose neutral, 39% of the respondents agreed and 36% of the respondents strongly agreed. Respondents were also asked whether product returns increases customer satisfaction (\bar{x} = 3.83, SD=1.05). 14% of the respondents disagreed, 22% of the respondents chose neutral, 31% of the respondents agreed and 33% of the respondents strongly agreed. Respondents were further asked whether their organization uses a time based turnaround strategy to measure product returns performance (\bar{x} = 3.81,

SD=1.12). 1% strongly disagreed, 18% disagreed, 11% chose neutral, 38% of the respondents agreed and 32% of the respondents strongly agreed.

Respondents were also asked whether their organization employs returns management to minimize wastage (\bar{x} = 4.04, SD=1.11). 3% of the respondents strongly disagreed, 10% of the respondents disagreed, 13% of the respondents chose neutral as they had no knowledge of this, 31% of the respondents agreed and 44% of the respondents strongly agreed. Lastly, the respondents were asked whether their organization regularly conducts capacity building on returns management in order to enhance productivity (\bar{x} = 3.35, SD=1.04). 3% of the respondents strongly disagreed, 18% of the respondents disagreed, 36% of the respondents chose neutral as they said there was no capacity building program in their organization, 28% agreed and 15% of the respondents strongly agreed.

The findings of this study confirmed that product returns influences value chain performance in the organization. This was supported by Panya and Marendi (2021) and Mogaka (2015) who found that syncing the returns process in the supply chain network made the returns process easier, increased customer satisfaction, minimizes wastage, enhances productivity and ensures continuous capacity building to ensure team work in achieving the goals listed thus improving the performance of the value chain.

4.4.5 Moderating Effect of Consumer Involvement

This study sought to determine the moderating effect of consumer involvement on value chain performance in the food and beverage industry in Kenya. The respondents were questioned on various indicators of consumer involvement on value chain performance. Their responses were rated on a 5 points Likert scale in which they either stated strongly disagree, disagree, neutral, agree and strongly agree. The results were expressed in percentages as shown in Table 4.8

Table 4.8: Measurement of Consumer Involvement

Statement	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)	Mean	Standard Deviation
Our organization makes arrangements with clients outside the distribution areas on the costs of product retrieval	3	8	15	39	35	3.94	1.05
Well managed product reversals in our firm have increased value to our customers	1	13	19	39	28	3.79	1.03
Our consumers reduce resource use in our organization through returning used products	3	10	19	40	28	3.81	1.04
Our consumers support our reverse logistics practices by purchasing our recycled/remanufactured products	3	8	24	39	26	3.78	1.02
Our organizations' value chain creates awareness to our consumers on the importance of reverse logistics	3	3	17	46	32	4.01	0.93
Our organization provides financial awards to customers who adopt sustainable value chain practices such as reverse logistics	3	10	19	40	28	3.81	1.04

N=72

The respondents were asked whether their organization makes arrangements with clients outside the distribution areas on the costs of product retrieval (\bar{x} = 3.94, SD=1.05). 3% of the respondents strongly disagreed with this statement, 8% of the respondents disagreed that their organization does not make alternative arrangements with their consumers on the costs of product retrieval, 15% of the respondents chose the neutral category, 39% of the respondents agreed and 35% of the respondents strongly agreed. The respondents were

also asked whether well managed product reversals in their firm have increased value to their customers (\bar{x} = 3.79, SD=1.03). 1% of the respondents strongly disagreed with this statement, 13% of the respondents disagreed, 19% of the respondents chose the neutral category, 39% of the respondents agreed that well managed product reversals have increased value to their consumers and 28% of the respondents strongly agreed with this statement. The respondents were asked whether consumers reduce resource use in their organization through returning used products (\bar{x} = 3.81, SD=1.04). 3% of the respondents strongly disagreed with this statement, 10% of the respondents disagreed, 19% of the respondents responded with neutral to represent they don't know, 40% of the respondents agreed with this statement and 28% of the respondents strongly agreed with this statement.

Respondents were also asked whether their consumers support their reverse logistics practices by purchasing their recycled/ remanufactured products (\bar{x} = 3.78, SD=1.02). 3% of the respondents strongly disagreed, 8% of the respondents disagreed, 24% of the respondents chose the neutral category, 39% of the respondents agreed that their consumers purchase their recycled/ remanufactured products and 26% of the respondents strongly agreed with this statement. The respondents were also asked whether their organizations' value chain creates awareness to their consumers on the importance of reverse logistics (\bar{x} = 4.01, SD=0.93). 3% of the respondents strongly disagreed with this statement, 3% of the respondents disagreed that their organizations do not create awareness to their consumers on the importance of reverse logistics, 17% of respondents chose the neutral category, 46% of the respondents agreed that they create awareness to consumers and 32% of the respondents strongly agreed with the statement. Finally, the respondents were asked whether their organization provides financial awards to customers who adopt sustainable value chain practices such as reverse logistics (\bar{x} = 3.81, SD=1.04). 3% of the respondents strongly disagreed with this statement, 10% of the respondents disagreed with this statement, 19% of the respondents chose the neutral category, 40% of the respondents agreed that their consumers are given financial rewards when they conduct reverse logistics and 28% of the respondents strongly agreed with this statement.

The study found that consumer involvement is key in ensuring the success of the reverse logistics process in the organization. This was supported by Prashant (2023), Yani, Jun,

Tang, Ming, & Xiaorui (2020), Hwang *et al.* (2020) and Sigala (2013) who found that sensitization and involvement of consumers in the reverse logistics processes improves performance of the value chains since consumers will actively participate and reap the rewards of this process, for instance through financial awards.

4.4.6 Value Chain Performance of Food and Beverage Industry in Kenya

This study sought to determine the rating of value chain performance of food and beverage firms in Kenya using the following indicators; efficiency, quality, degree of responsiveness and flexibility. The respondents were asked to indicate the extent to which they agreed with the opinion statements given in regard to value chain performance in their organizations. This was on a Likert scale of strongly disagree, disagree, neutral, agree and strongly agree.

4.4.6.1 Efficiency

The respondents were asked whether their organization has experienced a decrease in transaction costs throughout the value chain (\bar{x} = 3.60, SD=1.07). 1% strongly disagreed, 21% of the respondents disagreed, 14% of the respondents responded with neutral, 44% of the respondents agreed that the transaction costs have decreased and 19% of the respondents strongly agreed with the statement. The respondents were also asked whether their production costs have decreased over time throughout the value chain (\bar{x} = 3.81, SD=1.17). 8% of the respondents strongly disagreed, 4% of the respondents disagreed, 17% of the respondents chose neutral, 40% of the respondents agreed and 31% of the respondents strongly agreed with this statement. Respondents were also asked whether their organization is profitable (\bar{x} = 3.64, SD=1.15). 7% of the respondents strongly disagreed, 7% of the respondents disagreed, 28% of the respondents chose neutral, 32% of the respondents agreed that their organization is profitable and 26% of the respondents strongly agreed that their organization is profitable. 1% of the respondents strongly disagreed that the profits have increased steadily over the years, 13% of the respondents disagreed, 24% of the respondents chose neutral, 43% of the respondents agreed that profit has increased steadily over the years and 19% of the respondents strongly agreed. Finally,

respondents were asked whether their inventory carrying cost has decreased. 6% of the respondents strongly disagreed that their inventory carrying costs have not decreased (\bar{x} = 3.90, SD=1.16), 10% of the respondents disagreed, 10% of the respondents chose neutral, 39% of the respondents agreed that their inventory carrying costs have decreased and 36% of the respondents strongly agreed with this statement.

Table 4.9: Measurement of Efficiency

Statement	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)	Mean	Standard Deviation
Our organization has experienced a decrease in transaction costs throughout the value chain	1	21	14	44	19	3.60	1.07
Our production costs have decreased over time throughout the value chain	8	4	17	40	31	3.81	1.17
Our organization is profitable	7	7	28	32	26	3.64	1.15
Our profit margins have increased steadily over the years	1	13	24	43	19	3.67	0.98
Our organization has experienced a decrease in our inventory carrying costs	6	10	10	39	36	3.90	1.16

N=72

The study results were confirmed by Abdi (2012) who found that efficiency in performance is boosted by integration of the value chains which in turn leads to decrease in total costs of operations in the organization and increase in the profits enjoyed over time. Integration of the reverse logistics processes into different organizations in the food and beverage industry improves their value chains.

4.4.6.2 Quality

The respondents were asked whether their products were safe for use by their consumers ($\bar{x}= 3.79$, $SD=1.11$). 18% of the respondents disagreed and said that their products are recalled at times and are repurposed for alternative use. 11% of the respondents chose neutral, 38% of the respondents agreed that their products were safe for use and 32% of their respondents strongly agreed. Respondents were also asked whether their products have an extended shelf life to cater for safe consumption by consumers ($\bar{x}= 3.88$, $SD=1.20$). 3% of the respondents strongly disagreed that their products do not have a prolonged shelf life, 18% of the respondents disagreed, 7% chose neutral, 33% of the respondents agreed and 39% of the respondents strongly agreed. Respondents were asked whether the quality of their products is consistent ($\bar{x}= 3.79$, $SD=1.24$). 4% of the respondents strongly disagreed, 18% of the respondents disagreed, 10% of the respondents chose neutral, 31% of the respondents agreed that their quality is standard and consistent and 38% of the respondents strongly agreed. Respondents were also asked whether their products are easy for use by customers ($\bar{x}= 3.81$, $SD=1.10$). 3% of the respondents strongly disagreed, 11% of the respondents disagreed, 21% of the respondents chose neutral, 33% of the respondents agreed that their products are easy to use and 32% of the respondents strongly agreed. Lastly, the respondents were asked whether their organization receives a reduced number of customer complaints ($\bar{x}= 3.86$, $SD=1.18$). 1% of the respondents strongly disagreed, 21% disagreed, 6% of the respondents were neutral, 35% agreed and 38% of the respondents strongly agreed.

Table 4.10: Measurement of Quality

Statement	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)	Mean	Standard Deviation
Our products are safe for use by our consumers	0	18	11	39	32	3.79	1.11
Our products have a prolonged shelf life to cater for safe consumption by our consumers	3	18	7	33	39	3.88	1.20
The quality of our products is standard and consistent	4	18	10	31	38	3.79	1.24
Our products are convenient and easy to use by consumers	3	11	21	33	32	3.81	1.10
Our organization receives a reduced number of customer complaints	1	21	6	35	38	3.86	1.18

N=72

The study findings show that quality of the products is key in measuring value chain performance. The study results were confirmed by Panya & Marendi (2021) and Ristovska, Kozuharov, & Petkovski (2017) who found that quality of the products as they leave the organization influences the reverse logistics process of various consumers in the value chains in the food and beverage industry. Improvement in product quality reduces consumer complaints therefore improving the performance of the value chains in the food and beverage industry.

4.4.6.3 Degree of Responsiveness

The respondents were asked whether the order fill rate has increased in their organization over the years (\bar{x} = 3.99, SD=1.09). 3% of the respondents strongly disagreed, 10% of the respondents disagreed, 14% of the respondents chose neutral, 33% of the respondents agreed and 40% of the respondents strongly agreed. Respondents were also asked whether lead times for delivery of products has reduced (\bar{x} = 3.94, SD=1.10). 4% of the respondents strongly disagreed, 8% disagreed, 13% chose neutral, 39% agreed and 36% of the

respondents strongly agreed with the statement. Respondents were also asked whether there was a decrease in product delays along their organizations' value chain (\bar{x} = 3.33, SD=1.03). 7% of the respondents strongly disagreed, 11% of the respondents disagreed, 33% of the respondents selected neutral, 39% of the respondents agreed and 10% of the respondents strongly agreed with this statement. Respondents were asked whether there was a decrease in shipping errors along their organizations' value chain (\bar{x} = 3.78, SD=1.19). 1% strongly disagreed, 22% of the respondents disagreed, 8% of the respondents chose neutral, 33% of the respondents agreed and 35% strongly agreed. Finally, the respondents were asked whether their organization handles customer complaints in time (\bar{x} = 3.76, SD=1.26). 4% of the respondents strongly disagreed, 19% of the respondents disagreed, 10% of the respondents selected neutral, 29% of the respondents agreed and 38% of the respondents strongly agreed.

Table 4.11: Measurement of Degree of Responsiveness

Statement	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree	Strongly Agree	Mean	Standard Deviation
Our organizations' order fill rate has gradually increased over the years	3	10	14	33	40	3.99	1.09
Our organization has reduced lead times for delivery of products	4	8	13	39	36	3.94	1.10
There is a decrease in product delays along our organizations' value chain	7	11	33	39	10	3.33	1.03
There is a decrease in shipping errors along our organizations' value chain	1	22	8	33	35	3.78	1.19
Our organization handles customer complaints in time	4	19	10	29	38	3.76	1.26

N=72

The study findings indicate that there has been a gradual improvement in the performance of the value chains over the years. This is shown by reduction in shipping errors, product delays and lead times, increase in the order fill rate and timely handling of customer

complaints. The study results were confirmed by Panya & Marendi (2021), Nyarega, (2015) and Mwangangi (2016) who found that quality of the degree of responsiveness of the stakeholders in the implementation of the reverse logistics practices influenced the performance of the value chains positively as it promoted efficiency and customer satisfaction during and after the consumption of the products in the food and beverage industry. This shows that reverse logistics practices influence the performance of the value chains positively.

4.4.6.4 Flexibility

The respondents were asked whether their organizations are able to satisfy their customers' needs ($\bar{x}= 3.81$, $SD=1.10$). 3% of the respondents strongly disagreed, 11% of the respondents disagreed, 21% of the respondents chose neutral, 33% of the respondents agreed and 32% of the respondents strongly agreed. Respondents were also asked whether their organization is able to vary delivery time according to demand ($\bar{x}= 3.85$, $SD=1.19$). 1% of the respondents strongly disagreed with this statement, 22% of the respondents disagreed, 4% of the respondents chose neutral, 35% of the respondents agreed and 38% of the respondents strongly agreed. Respondents were asked whether their organization was able to increase production in case of an increase in demand ($\bar{x}= 3.96$, $SD=1.12$). 3% of the respondents strongly disagreed, 11% of the respondents disagreed, 14% of the respondents chose neutral, 32% of the respondents agree and 40% of the respondents strongly agree. Lastly, the respondents were asked whether they are able to recover their lost sales ($\bar{x}= 3.94$, $SD=1.10$). 4% of the respondents strongly disagreed, 85 of the respondents disagreed, 13% of the respondents chose neutral, 39% of the respondents agreed and 36% of the respondents strongly agreed.

Table 4.12: Measurement of Flexibility

Statement	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)	Mean	Standard Deviation
Our organization is able to satisfy our customer's needs	3	11	21	33	32	3.81	1.10
Our organization is able to vary delivery time according to demand	1	22	4	35	38	3.85	1.19
Our organization is able to increase production should there be an increase in demand	3	11	14	32	40	3.96	1.12
Our organization is able to recover lost sales	4	8	13	39	36	3.94	1.10

N=72

The study results were confirmed by Abdi (2012) who found that flexibility in the fulfilment of consumer requirements positively influences value chain performance. This is because timely delivery of consumer orders leads to increase in the demand of the products and the ability to reverse the products after and during consumption leads to recovery of lost sales which positively influences the value chain performance.

Additionally, the study participants were requested to indicate the approximate total operational costs incurred by the company in the financial years 2016/2017 to 2019/2020. From these findings, the study established that the operational costs increased which might have been as a result of investment in reverse logistics practices in a bid to improve value chain performance.

Table 4.13: Approximate Total Operational Cost Percentages

Year	< 100m	100-200m	201-300m	> 300m
2016/2017	18.70%	9.35%	29.50%	42.45%
2017/2018	14.39%	14.39%	23.02%	47.20%
2018/2019	11.51%	15.83%	17.99%	54.68%
2019/2020	8.63%	12.95%	15.11%	63.31%

4.5 Diagnostic Test Results

4.5.1 Test for Normality

For purposes of this study, Kolmogorov-Smirnov and Shapiro-Wilk tests were used to test for normality. As a rule of thumb, (Thode 2002 as cited in Thogori, 2017) Kolmogorov-Smirnov is used for small samples and for large samples, Shapiro Wilk test is adopted. The test statistic for normality is $p > .05$. P-values greater than 0.05 indicates that the data is normally distributed. On the contrary, a P-value < 0.05 indicates that the data is not normally distributed. Table 4.14 below shows the significance levels of recycling practices ($p = 0.054$), reusing practices ($p = .238$), remanufacturing practices ($p = 0.131$), product returns ($p = 0.122$), consumer involvement ($p = 0.73$), and value chain performance ($p = 0.575$). From the table, we can conclude that all the variables exhibit a normal distribution. Hence the data satisfies the first assumption of regression that for one to conduct regression analysis, data must be normally distributed.

Table 4.14: Test of Normality

Variables	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Recycling Practices	.133	72	.003	.967	72	.054
Reusing Practices	.100	72	.074	.978	72	.238
Remanufacturing Practices	.108	72	.036	.973	72	.131
Product Returns	.121	72	.011	.973	72	.122
Consumer Involvement	.149	72	.000	.944	72	.073
Value Chain Performance	.075	72	.200*	.985	72	.575

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

To corroborate the skewness and kurtosis results, the graphical representation showed the line signifying the actual data distribution closely follows the diagonal in the normal Q-Q plot as illustrated in Figures 4.1 to 4.6 below, connoting normal distribution (Lorenzo-Arribas, 2019). In Q-Q plot, or the normal probability plot, the observed value for each score is plotted against the expected value from the normal distribution, whereby, a sensibly straight line implies a normal distribution and if the points in a Q-Q plot depart from a straight line, then the assumed distribution is called into question. Looking at the above Q-Q plots for all the variables the departure from normality is non-existent, this corroborates the Shapiro Wilk test for normality.

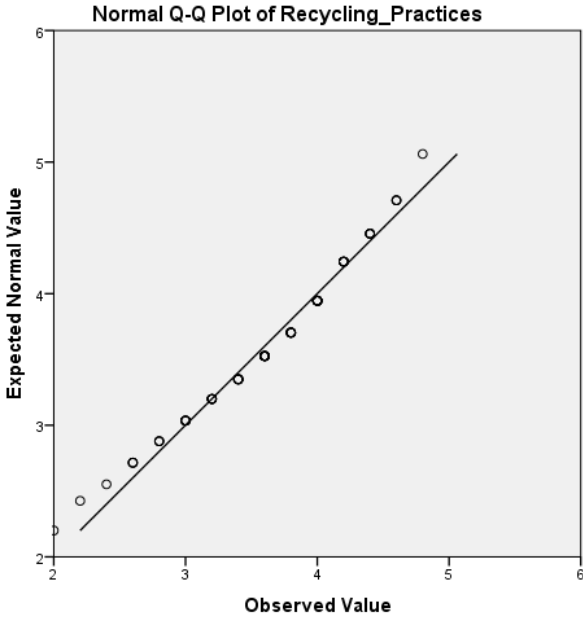


Figure 4.1: Q-Q Plots for Recycling

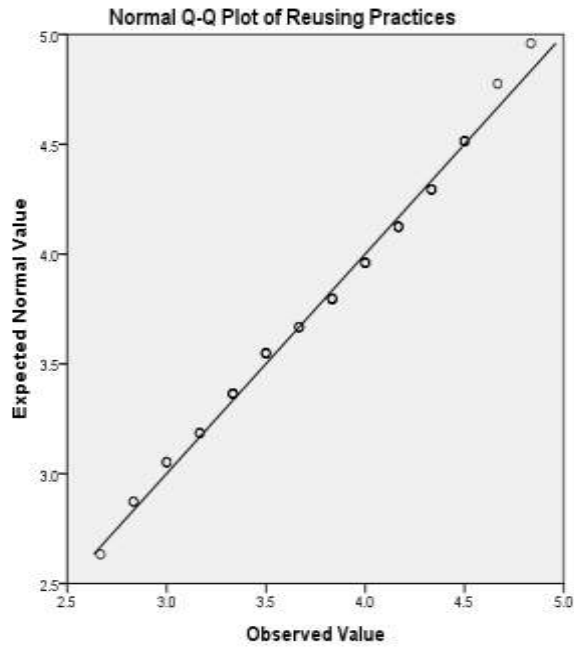


Figure 4.2: Q-Q Plot for Reusing Practices

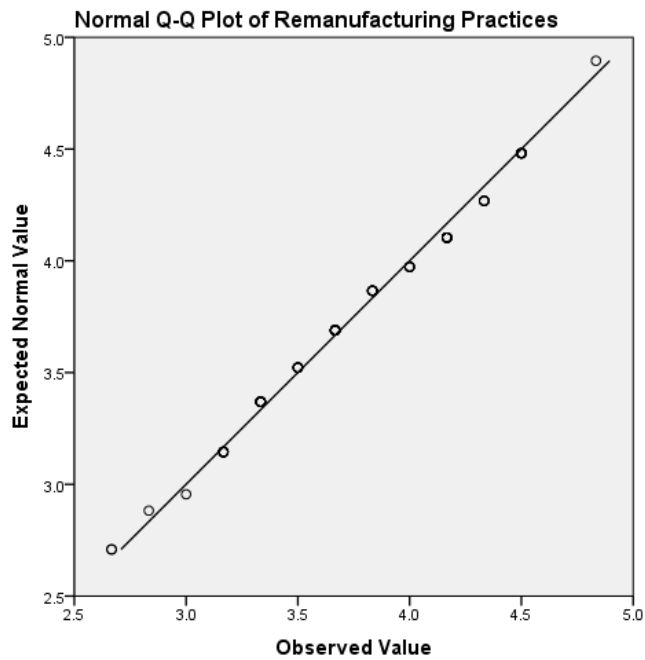


Figure 4.3: Q-Q Plot for Remanufacturing Practices

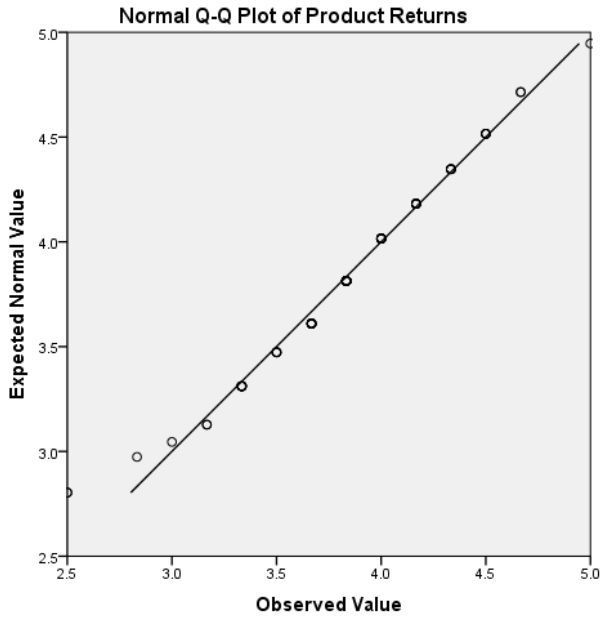


Figure 4.4: Q-Q Plot for Product Return Practices

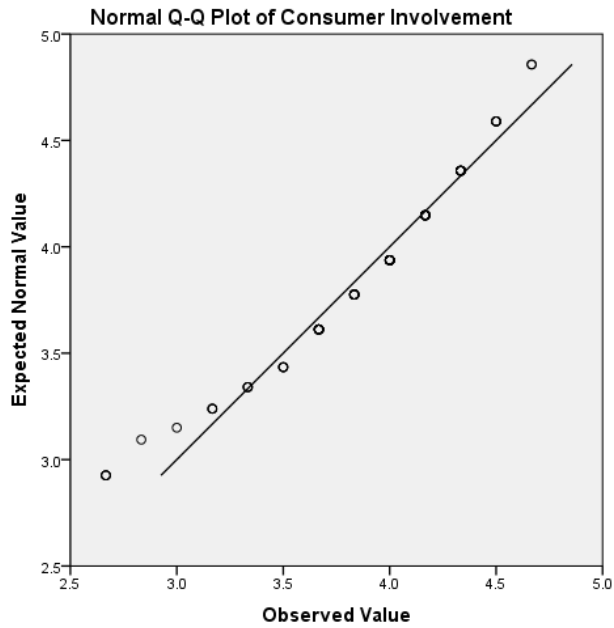


Figure 4.5: Q-Q Plot for Consumer Involvement

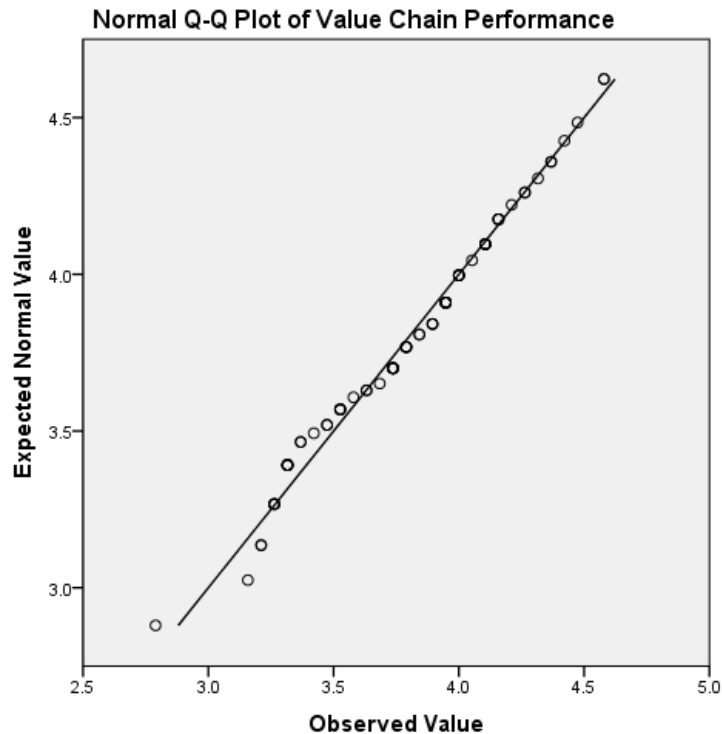


Figure 4.6: Q-Q Plot for Value Chain Performance

4.5.2 Test for Multicollinearity

In Ordinary Least Square Regression, multicollinearity describes the linear relationship between independent variables. Normally, it occurs when the model includes several variables that are significantly correlated with both independent and dependent variables. Presence of greater inter-correlations among factors in the regression model result into skewed data and delude results (Shrestha, 2020). In a stricter sense, multicollinearity inflates the standard errors and confidence intervals resulting into unstable estimates of coefficients (Belsley *et al.*, 1978). The study adopted the Variance Inflation Factor (VIF) to test for multicollinearity. The rule of thumb is that a VIF less than 3 ($VIF \leq 3$) indicates absence of multicollinearity and a VIF of >10 indicates presence of multicollinearity. Table 4.15 below indicates the test of multicollinearity which shows that there are no redundancies because the independent variables are not highly correlated. The VIF for the variables ranged between 1.012-1.175.

Table 4.15: Test for Multicollinearity

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	.482	.472		1.022	.310		
1 Recycling Practices	.255	.048	.389	5.372	.000	.851	1.175
Reusing Practices	.104	.056	.129	1.845	.069	.914	1.094
1 Remanufacturing Practices	.477	.055	.582	8.671	.000	.988	1.012
Product Returns	.171	.058	.205	2.968	.004	.935	1.070
Consumer Involvement	-.119	.060	-.140	-1.971	.053	.881	1.134

a. Dependent Variable: Value Chain Performance

4.5.3 Test for Autocorrelation

The test of autocorrelation was conducted to establish whether or not the residuals were serially correlated. Durbin-Watson test was adopted to test autocorrelation. The Durbin Watson test yields values ranging from 0-4. A value of 2 indicates absence of autocorrelation. A value <2 indicates a positive autocorrelation while >2 indicates a negative autocorrelation. The decision criteria is that test statistic values ranging from 1.5-2.5 are relatively normal and values beyond this threshold are cause for concern. Table 4.16 indicates the results for the test of autocorrelation from which we accept the null hypothesis that there is no autocorrelation is accepted and that residuals are not auto correlated. The Durbin Watson Test value was 2.422 which is close to the perfect value of 2.0. It indicates absence of autocorrelation.

Table 4.16: Test for Autocorrelation

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.840 ^a	.706	.684	.22209	2.422

a. Predictors: (Constant), Consumer Involvement, Remanufacturing Practuces, Reusing Practices, Product Returns, Recycling Practices

b. Dependent Variable: Value Chain Performance

4.5.4 Test for Heteroscedasticity

Heteroscedasticity refers to a scenario where the variance of the dependent variable varies across the data as opposed to a situation whereby OLS assumes that $V(\epsilon_j)=\sigma^2$ for all j , which means that the variance of the error term is constant (homoscedasticity). Park (2008) contended that heteroscedasticity complicates analysis because in regression analysis, many methods are based on the assumption of equal variance. Breusch-pagan test gives a chi-square value and a significance value, whereby a p-value < 0.05 indicates that there is heteroscedasticity while a p-value greater than 0.05 indicates heteroscedasticity does not exist.

Breusch-pagan/Cook-Weisberg Test was used to conduct the test for heteroscedasticity. The test has a null hypothesis that that error terms have constant variance (i.e. homoscedastic). The results in table 4.17 indicates that error terms are homoscedastic, implying that they do not affect individual variables in the model.

Table 4.17: Test for Heteroscedasticity

Test	Chi-Square Value	Sig.
Breusch-Pagan	1.74	0.1871

4.6 Correlation Analysis

Correlation analysis was adopted in this study to establish the degree of linear relationships between the variables under study. It helps establish whether there is multicollinearity whose presence is confirmed by the Variance Inflation Factor index. According to Tabachnick and Fidell, (2013) correlation value ranges from -1 to 1 and high correlation values greater than 0.90 indicates presence of multicollinearity. All the correlations for the variables under study were less than 0.90. This confirms that the study variables were sufficient diverse measures of distinct factors. Hence all variables were considered for analysis. Table 4.18 below shows the correlation between the independent variables namely; recycling practices, reusing practices, remanufacturing practices, product returns, consumer involvement and value chain performance.

Table 4.18: Correlation of Study Variables

		Recycling	Reusing	Remanufacturing	Product Returns	Consumer Involvement	Value Chain Performance
Recycling	Pearson Correlation	1	.242*	.122	.119	-.288*	.531**
	Sig. (2-tailed)		.041	.308	.321	.014	<.001
	N	72	72	72	72	72	72
Reusing	Pearson Correlation	.242*	1	.109	-.095	-.025	.222
	Sig. (2-tailed)	.041		.360	.427	.834	.061
	N	72	72	72	72	72	72
Remanufacturing	Pearson Correlation	.122	.109	1	.003	-.115	.620**
	Sig. (2-tailed)	.308	.360		.978	.337	<.001
	N	72	72	72	72	72	72
Product Returns	Pearson Correlation	.119	-.095	.003	1	-.271*	.342**
	Sig. (2-tailed)	.321	.427	.978		.022	.003
	N	72	72	72	72	72	72
Consumer Involvement	Pearson Correlation	-.288*	-.025	-.115	-.271*	1	-.411**
	Sig. (2-tailed)	.014	.834	.337	.022		<.001
	N	72	72	72	72	72	72
Value Chain Performance	Pearson Correlation	.531**	.222	.620**	.342**	-.411**	1
	Sig. (2-tailed)	<.001	.061	<.001	.003	<.001	
	N	72	72	72	72	72	72

*. Correlation is significant at the 0.05 level (2-tailed).

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

The study found that there was a statistically significant relationship between recycling practices and value chain performance ($r = 0.531$; $p = 0.000$) at 5% level of confidence. This indicates that an increase in recycling practices results in increase in value chain performance. This was corroborated by Panya & Marendi (2021) and Saruchera (2021) who stated that there is a link between recycling and value chain performance. Recycling saves firms the cost of transportation of materials to be disposed and the cost of land acquisition. For instance, in New Zealand, the setup costs for a landfill vary between \$2m to \$30m with annual capacities between 10,000 tonnes to 500,000 tonnes. Panya & Marendi (2021) found that recycling saves the firm energy consumption and promotes material recovery. In order for recyclables to have value as a potential new raw material, both supply and demand for the material have to be developed. This is where the idea of reverse logistics is of paramount importance. In particular, because the value of an empty soda bottle or used newspaper is frequently not obvious to either consumers or

manufacturers, the incentive to recycle may be quite low. Ochiri et al, (2015) on the effects of Recycling Strategy on Firm Performance found that recycling strategy had influence on firm performance. It recommended that entrepreneurs need to adopt recycling strategy and set up intermediary businesses, capitalizing on wastes and returns from the mainstream publishing firms. It also recommended that within the publishing value chains, the publishing firms should embrace recycling as an investment for improved performance, thereby moving towards sustainable growth which is one of the foundations of Kenyan Vision 2030 (Panya & Marendi, 2021).

Further, the study established that there was a statistically significant relationship between reusing practices and value chain performance. ($r = 0.242$; $p = 0.000$) at 5% level of confidence. This indicates that an increase in reusing practices results in increase in value chain performance. Mutiso and Gatari (2023) and Zamora (2016) in their studies supported this finding by concluding that product reuse through product retrading, product recall and product recycling positively influence the performance of value chains in the food and beverage industry as they lead to cost reductions, increase in market share and improved profitability of the firm.

More so, the study established that there was a statistically significant relationship between remanufacturing practices and value chain performance. ($r = 0.633$; $p = 0.000$) at 5% level of confidence. This indicates that an increase in remanufacturing practices results in increase in value chain performance. Gatari and Mutiso (2022) supported this with their findings which showed that remanufacturing helps in conservation of materials. This is because remanufacturing helps in reducing energy consumption, product waste and disposal costs through integration and streamlining the value chain during manufacturing and the operations. Their study further revealed that product alterations, product remodeling and product redesigning reduces the cost of operations in the organization, expands market share and increases profitability through streamlining of the value chains.

Additionally, the study established that there was a statistically significant relationship between product returns and value chain performance. ($r = 0.291$; $p = 0.000$) at 5% level of confidence. This indicates that an increase in product returns results in increase in value

chain performance. This was corroborated by Maina & Lambaino, (2022) and Muthoni and Mose (2020) who found that product returns positively affects value chain performance of food and beverage firms through product recovery, cost reduction and increasing organizational profitability. They recommended that in order to ensure that food and beverage manufacturing firms have better performance, they should focus more on using their product returns management so as to ascertain procedures are adhered to and product recovery is done properly and to ensure that there is consistency of reverse logistics of products that need reworks. In the same regard, they should involve suppliers early enough to enable them to have a product returns policy and procedure.

Additionally, the study established that there was a statistically significant low relationship between customer involvement and value chain performance. ($r = -0.288$; $p = 0.000$) at 5% level of confidence. This indicates that an increase in consumer involvement results in a decrease in value chain performance. This is supported by Dong and Sivakumar (2017) who found that restricting customer participation reduced service delivery complexity, which improved employee productivity and overall service performance. Lengnick-Hall, Beck & Lengnick-Hall (2019) also noted that low consumer involvement in design or logistics processes allows firms to streamline operations, maintain standardization, and reduce costs-leading to better supply chain reliability and performance outcomes.

4.7 Simple Linear Regression Model

4.7.1 Recycling Practices and Value Chain Performance

R is the correlation coefficient (simple correlation coefficient) measures the strength and direction of the linear relationship between the recycling practices and value chain performance. In this case, the R value is 0.531, indicating a moderate positive relationship between the predictor (recycling practices) and the dependent variable (value chain performance). R Square represents the coefficient of determination and it indicates the proportion of variance in the dependent variable that can be explained by the recycling

practices. In this case, the R-squared value is 0.282, meaning that approximately 28.2% of the variance in the value chain performance can be explained by the recycling practices.

The adjusted R-squared value takes into account the number of predictors and sample size, providing a more conservative estimate of the proportion of variance explained. In this case, the adjusted R-squared value is 0.272. Std. Error of the Estimate value is 0.33702 which represents the standard deviation of the residuals, providing an indication of the average distance between the observed and predicted values.

Table 4.19: Model Summary of Recycling Practices

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.531 ^a	.282	.272	.33702

a. Predictors: (Constant), Recycling Practices

b. Dependent Variable: Value Chain Performance

The ANOVA Table below examines the overall significance of the regression model. The regression sum of squares of 3.121 represents the variability in the dependent variable explained by the predictor variable; recycling practices. The residual sum of squares value of 7.951 represents the unexplained variability or error term in the model. The total sum of squares is 11.072 and accounts for the sum of the regression sum of squares and the residual sum of squares. The F-statistic=27.479 and it tests the overall significance of the regression model. With a p-value of .000, which is less than the conventional significance level of .05, we can conclude that the regression model is statistically significant. This suggests that the recycling practices have a significant impact on value chain performance.

Table 4.20: ANOVA of Recycling Practices

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.121	1	3.121	27.479	.000 ^b
	Residual	7.951	70	.114		
	Total	11.072	71			

a. Dependent Variable: Value Chain Performance

b. Predictors: (Constant), Recycling Practices

The coefficients table 4.21 below shows that the constant term 2.520 represents the expected value of the dependent variable value chain performance when the recycling practices are at zero.

The coefficient for recycling practices (0.349) indicates that a one-unit increase in the recycling practices is associated with a 0.349 increase in value chain performance. The standardized coefficient (beta) of 0.531 suggests a moderate positive relationship.

Table 4.21: Coefficients of Recycling Practices

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.520	.245		10.293	.000
	Recycling Practices	.349	.067	.531	5.242	.000

a. Dependent Variable: Value Chain Performance

The specific model;

$$Y = \beta_0 + \beta_1 X + \epsilon$$

$$\text{Value Performance} = 2.520 + 0.349 \text{ Recycling Practices}$$

4.7.2 Reusing Practices and Value Chain Performance

R is the correlation coefficient (simple correlation coefficient) measures the strength and direction of the linear relationship between the recycling practices and value chain performance. In this case, the R value is 0.222, indicating a moderate positive relationship between the predictor (reusing practices) and the dependent variable (value chain performance). R Square represents the coefficient of determination and it indicates the proportion of variance in the dependent variable that can be explained by the recycling practices. In this case, the R-squared value is 0.049, meaning that approximately 4.9% of the variance in the value chain performance can be explained by the reusing practices.

The adjusted R-squared value takes into account the number of predictors and sample size, providing a more conservative estimate of the proportion of variance explained. In this case, the adjusted R-squared value is 0.036. Std. Error of the Estimate value is 0.33732

which represents the standard deviation of the residuals, providing an indication of the average distance between the observed and predicted values.

Table 4.22: Model Summary of Reusing Practices

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.222 ^a	.049	.036	.37732

a. Predictors: (Constant), Reusing Practices

b. Dependent Variable: Value Chain Performance

The ANOVA table below examines the overall significance of the regression model. The regression sum of squares of 0.517 represents the variability in the dependent variable explained by the predictor variable; reusing practices. The residual sum of squares value of 9.966 represents the unexplained variability or error term in the model. The total sum of squares is 10.483 and accounts for the sum of the regression sum of squares and the residual sum of squares. The F-statistic=3.632 and it tests the overall significance of the regression model. With a p-value of .061, which is higher than the conventional significance level of .05, we can conclude that the regression model is not statistically significant. This suggests that the reusing practices have an insignificant impact on value chain performance.

Table 4.23: ANOVA of Reusing Practices

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.517	1	.517	3.632	.061 ^b
	Residual	9.966	70	.142		
	Total	10.483	71			

a. Dependent Variable: Value Chain Performance

b. Predictors: (Constant), Reusing Practices

The coefficients table below shows that the constant term of 3.132 represents the expected value of the dependent variable value chain performance when the reusing practices are at zero.

The coefficient for reusing practices (0.175) indicates that a one-unit increase in the reusing practices is associated with a 0.175 increase in value chain performance. The standardized coefficient (beta) of 0.222 suggests a moderate positive relationship.

Table 4.24: Coefficients of Reusing Practices

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.132	.351		8.930	.000
	Reusing Practices	.175	.092	.222	1.906	.061

a. Dependent Variable: Value Chain Performance

The specific model;

$$Y = \beta_0 + \beta_1 X + \varepsilon$$

$$\text{Value Performance} = 3.132 + 0.175 \text{ Reusing Practices}$$

4.7.3 Remanufacturing Practices and Value Chain Performance

R is the correlation coefficient (simple correlation coefficient) measures the strength and direction of the linear relationship between the recycling practices and value chain performance. In this case, the R value is 0.620, indicating a moderate positive relationship between the predictor (remanufacturing as a reverse logistics practice) and the dependent variable (value chain performance). R Square represents the coefficient of determination and it indicates the proportion of variance in the dependent variable that can be explained by the recycling practices. In this case, the R-squared value is 0.384, meaning that approximately 38.4% of the variance in the value chain performance can be explained by the recycling practices.

The adjusted R-squared value takes into account the number of predictors and sample size, providing a more conservative estimate of the proportion of variance explained. In this case, the adjusted R-squared value is 0.376. Std. Error of the Estimate value is 0.30362 which represents the standard deviation of the residuals, providing an indication of the average distance between the observed and predicted values.

Table 4.25: Model Summary of Remanufacturing Practices

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.620 ^a	.384	.376	.30362

- a. Predictors: (Constant), Remanufacturing Practices
- b. Dependent Variable: Value Chain Performance

The ANOVA table below examines the overall significance of the regression model. The regression sum of squares of 4.030 represents the variability in the dependent variable explained by the predictor variable; remanufacturing as a reverse logistics practice. The residual sum of squares value of 6.453 represents the unexplained variability or error term in the model. The total sum of squares is 10.483 and accounts for the sum of the regression sum of squares and the residual sum of squares. The F-statistic=43.717 and it tests the overall significance of the regression model. With a p-value of .000, which is less than the conventional significance level of .05, we can conclude that the regression model is statistically significant. This suggests that the remanufacturing as a reverse logistics practice has a significant impact on value chain performance.

Table 4.26: ANOVA of Remanufacturing Practices

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4.030	1	4.030	43.717	.000 ^b
	Residual	6.453	70	.092		
	Total	10.483	71			

- a. Dependent Variable: Value Chain Performance
- b. Predictors: (Constant), Remanufacturing Practices

The coefficients table below shows that the constant term 1.9442 represents the expected value of the dependent variable value chain performance when the remanufacturing as a reverse logistics practice is at zero.

The coefficient for remanufacturing as a reverse logistics practice (0.494) indicates that a one-unit increase in the recycling practices is associated with a 0.494 increase in value chain performance. The standardized coefficient (beta) of 0.620 suggests a moderate positive relationship.

Table 4.27: Coefficients of Remanufacturing Practices

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.942	.282		6.878	.000
	Remanufacturing Practices	.494	.075	.620	6.612	.000

a. Dependent Variable: Value Chain Performance

The specific model;

$$Y = \beta_0 + \beta_1 X + \varepsilon$$

$$\text{Value Performance} = 1.942 + 0.494 \text{ Remanufacturing Practices}$$

4.7.4 Product Returns and Value Chain Performance

R is the correlation coefficient (simple correlation coefficient) measures the strength and direction of the linear relationship between the recycling practices and value chain performance. In this case, the R value is 0.342, indicating a moderate positive relationship between the predictor (products returns) and the dependent variable (value chain performance). R Square represents the coefficient of determination and it indicates the proportion of variance in the dependent variable that can be explained by the products returns. In this case, the R-squared value is 0.117, meaning that approximately 11.7% of the variance in the value chain performance can be explained by the products returns.

The adjusted R-squared value takes into account the number of predictors and sample size, providing a more conservative estimate of the proportion of variance explained. In this case, the adjusted R-squared value is 0.104. Std. Error of the Estimate value is 0.36366 which represents the standard deviation of the residuals, providing an indication of the average distance between the observed and predicted values.

Table 4.28: Model Summary of Product Returns

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.342 ^a	.117	.104	.36366

- a. Predictors: (Constant), Product Returns
b. Dependent Variable: Value Chain Performance

The ANOVA table below examines the overall significance of the regression model. The regression sum of squares of 1.226 represents the variability in the dependent variable explained by the predictor variable; product returns. The residual sum of squares value of 9.257 represents the unexplained variability or error term in the model. The total sum of squares is 10.483 and accounts for the sum of the regression sum of squares and the residual sum of squares. The F-statistic=9.268 and it tests the overall significance of the regression model. With a p-value of .003, which is less than the conventional significance level of .05, we can conclude that the regression model is statistically significant. This suggests that the product returns has a significant impact on value chain performance.

Table 4.29: ANOVA of Product Returns

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.226	1	1.226	9.268	.003 ^b
	Residual	9.257	70	.132		
	Total	10.483	71			

- a. Dependent Variable: Value Chain Performance
b. Predictors: (Constant), Product Returns

Table 4.30: Coefficients of Product Returns

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.732	.352		7.768	.000
	Product Returns	.278	.091	.342	3.044	.003

- a. Dependent Variable: Value Chain Performance

The specific model;

$$Y = \beta_0 + \beta_1 X + \epsilon$$

$$\text{Value Performance} = 2.732 + 0.278 \text{ Product Returns}$$

4.8 Overall Regression Model

Regression analysis was used to determine whether the independent variables recycling, reusing, remanufacturing and product returns influence the dependent variable value chain performance of the food and beverage industry in Kenya. The table below illustrates the coefficients of the overall regression model.

The coefficient of determination, R-squared, represents the proportion of variance in the dependent variable; value chain performance that can be explained by the predictors. In this case, the R-squared value is 0.666. The R-squared value of 0.666 suggests that about 66.6% of the variance in the value chain performance can be explained by the predictors (recycling practices, reusing practices, remanufacturing practices and product returns practices). This indicates a relatively strong relationship between these reverse logistics practices and the value chain performance.

Table 4.31: Model Summary of Overall Regression Model

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.816 ^a	.666	.646	.22846

a. Predictors: (Constant): Product Returns, Remanufacturing Practices, Reusing Practices, Recycling Practices

b. Dependent Variable: Value Chain Performance

Moving on to the ANOVA table, it provides information about the overall significance of the regression model. The regression sum of squares value of 6.986 represents the variability in the dependent variable that is explained by the predictors. The residual sum of squares value of 3.497 represents the unexplained variability or error term in the model. The total sum of squares (10.483) is the sum of the regression sum of squares and the residual sum of squares. The F-statistic (33.461) tests the overall significance of the regression model. With a p-value of .000, which is less than the conventional significance level of .05, we can conclude that the regression model is statistically significant. This indicates that the combined effects of the (recycling practices, reusing practices,

remanufacturing as a reverse logistics practice and product returns) have a significant impact on the dependent variable; value chain performance.

Table 4.32: ANOVA of Overall Regression Model

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6.986	4	1.746	33.461	.000 ^b
	Residual	3.497	67	.052		
	Total	10.483	71			

a. Dependent Variable: Value Chain Performance

b. Predictors: (Constant), Product Returns, Remanufacturing Practices, Reusing Practices, Recycling Practices

Moving to the coefficients table, it provides information about the individual predictor variables and their relationship with the dependent variable. The constant term (-0.25) represents the expected value of the dependent variable when all predictor variables are set to zero. The coefficients for the predictor variables indicate the change in the dependent variable for a one-unit change in each predictor, holding other predictors constant recycling practices have a positive and significant effect (beta = 0.247, p = .000) on the value chain performance. This suggests that better recycling practices are associated with improved value chain performance.

Reusing practices has a positive but insignificant effect (beta = 0.089, p = .130) on the value chain performance. This indicates that reusing practices minimally influences value chain performance. Remanufacturing as a reverse logistics service has a positive and significant effect (beta = 0.453, p = .000) on the value chain performance. This suggests that remanufacturing contribute to better value chain performance. Product returns has a positive and highly significant effect (beta = 0.058, p = .000) on value chain performance. This indicates that efficient product returns practices are associated with improved value chain performance.

Table 4.33: Coefficients of the Overall Regression Model

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-.025	.377		-.066	.948
1 Recycling Practices	.247	.047	.386	5.242	.000
Reusing Practices	.089	.058	.113	1.532	.130
Remanufacturing Practices	.453	.057	.569	8.012	.000
Product Returns	.233	.058	.286	3.987	.000

a. Dependent Variable: Value Chain Performance

The model before moderation is;

$$Y = \beta_0 + Z(\beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4) + \epsilon$$

$$\text{Value Chain Performance} = -0.025 + 0.247 X_1 + 0.089 X_2 + 0.453 X_3 + 0.233 X_4$$

Where,

Y = Value Chain Performance

X₁ = Recycling

X₂ = Reusing

X₃ = Remanufacturing

X₄ = Product Returns

4.9 Regression Model after the Moderation

The results in the table below shows the moderating effect of Consumer Involvement on the relationship between reverse logistics practices and value chain performance. In this case, the R value after the moderation reduced from 0.816 to 0.421 indicating a moderate positive relationship between the predictors and the dependent variable. The coefficient of determination, R-squared, represents the proportion of variance in the dependent variable; value chain performance that can be explained by the predictors. In this case, the R-squared value changed from 0.666 to 0.177 after moderation. The R-squared value of 0.177 suggests that about 17.7% of the variance in the value chain performance can be explained by the predictors (recycling practices, reusing practices, remanufacturing as a

reverse logistics practice and product returns) all moderated by Consumer Involvement. This indicates a moderate relationship between these reverse logistics practices and the value chain performance.

Table 4.34: Model Summary after the Moderation

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.421 ^a	.177	.128	.35874

a. Predictors: (Constant), X4Z, X1z, X3Z, X2Z

Moving on to the ANOVA table, it provides information about the overall significance of the regression model. The regression sum of squares value of 6.986 represents the variability in the dependent variable that is explained by the predictors after the moderation. The residual sum of squares value of 1.861 represents the unexplained variability or error term in the model. The total sum of squares (10.483) is the sum of the regression sum of squares and the residual sum of squares. The F-statistic (3.614) tests the overall significance of the regression model. With a p-value of .010, which is less than the conventional significance level of .05, we can conclude that the regression model is statistically significant. This indicates that the combined effects of the (recycling practices, reusing practices, remanufacturing as a reverse logistics practice and product returns) with the moderator have a significant impact on the dependent variable; value chain performance.

Table 4.35: ANOVA after the Moderation

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.861	4	.465	3.614	.010 ^b
	Residual	8.622	67	.129		
	Total	10.483	71			

a. Dependent Variable: Value Chain Performance

b. Predictors: (Constant), X4Z, X1z, X3Z, X2Z

Moving to the coefficients table, it provides information about the individual predictor variables after moderation and their relationship with the dependent variable. The constant term (3.266) represents the expected value of the dependent variable when all predictor variables are set to zero. The coefficients for the predictor variables indicate the change

in the dependent variable for a one-unit change in each predictor, holding other predictors constant moderated recycling practices have a positive and significant effect (beta = 0.050, p = .014) on the value chain performance. This suggests that better recycling practices are associated with improved value chain performance.

Reusing practices after moderation has a negative significant effect (beta = -0.049, p = .019) on the value chain performance. This indicates that moderated reusing practices has a negative influence on value chain performance. Moderated remanufacturing as a reverse logistics service has a positive and significant effect (beta = 0.049, p = .018) on the value chain performance. This suggests that remanufacturing contribute to better value chain performance. Moderated product returns has a negative yet insignificant effect (beta = -0.010, p = 0.625) on value chain performance. This indicates that efficient product returns practices are associated with negative value chain performance.

Table 4.36: Coefficients after the Moderation

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	
	B	Std. Error	Beta			
	(Constant)	3.266	.335		9.740	.000
1	X1z	.050	.020	.328	2.532	.014
	X2Z	-.049	.020	-.340	-2.409	.019
	X3Z	.049	.020	.332	2.436	.018
	X4Z	-.010	.021	-.062	-.491	.625

a. Dependent Variable: Value Chain Performance

The model after moderation is;

$$Y = \beta_0 + Z(\beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4) + \epsilon$$

Therefore, the model with the moderator is as follows:

$$\text{Value Chain Performance} = 3.266 + 0.050 X_1 * Z - 0.049 X_2 * Z + 0.049 X_3 * Z - 0.010 X_4 * Z$$

Where,

$$Y = \text{Value Chain Performance}$$

$X_1 * Z = \text{Recycling} * \text{Consumer Involvement}$

$X_2 * Z = \text{Reusing} * \text{Consumer Involvement}$

$X_3 * Z = \text{Remanufacturing} * \text{Consumer Involvement}$

$X_4 * Z = \text{Product Returns} * \text{Consumer Involvement}$

4.10 Hypothesis Testing

The test of hypothesis was conducted using the Ordinary Least Square Regression. The acceptance/rejection criteria were; reject the null hypothesis if the p-value is less than the conventional 0.05. Fail to reject the null hypothesis if the p-value is higher than the conventional 0.05.

H₀₁: Recycling does not have a significant effect on value chain performance in the food and beverage industry in Kenya.

The null hypothesis was that recycling does not have a significant effect on value chain performance in the food and beverage industry in Kenya. Results in Table 4.32 indicates that p-value (0.000) was less than the conventional p-value ($p=0.05$). This demonstrates that recycling practices have a significant effect on performance in food and beverage industry in Kenya. Otherwise put, the role of recycling practices in determining the value chain performance in the food and beverage industry in Kenya cannot be ignored. In conclusion, we reject the null hypothesis H₀₁: Recycling does not have a significant effect on value chain performance in the food and beverage industry in Kenya.

H₀₂: Reusing of products does not have a significant effect on value chain performance in the food and beverage industry in Kenya.

The null hypothesis was that reusing does not have a significant effect on value chain performance in the food and beverage industry in Kenya. Results in Table 4.32 indicates that p-value (0.130) was greater than the conventional p-value ($p=0.05$). This demonstrates that recycling practices does not have a significant effect on performance in food and beverage industry in Kenya. In conclusion, the

researcher failed to reject the null hypothesis H_{02} : Reusing of products does not have a significant effect on value chain performance in the food and beverage industry in Kenya.

H_{03} : Remanufacturing does not have a significant effect on value chain performance in the food and beverage industry in Kenya.

The null hypothesis was that remanufacturing does not have a significant effect on value chain performance in the food and beverage industry in Kenya. Results in Table 4.32 indicates that p-value (0.000) was less than the convectional p-value ($p= 0.05$). This demonstrates that remanufacturing practices have a significant effect on performance in food and beverage industry in Kenya. Otherwise put, the role of remanufacturing practices in determining the value chain performance in the food and beverage industry in Kenya cannot be ignored. In conclusion, we reject the null hypothesis H_{03} : Remanufacturing does not have a significant effect on value chain performance in the food and beverage industry in Kenya.

H_{04} : Product return does not have a significant effect on value chain performance in the food and beverage industry in Kenya.

The null hypothesis was that product returns does not have a significant effect on value chain performance in the food and beverage industry in Kenya. Results in Table 4.32 indicates that p-value (0.000) was less than the convectional p-value ($p= 0.05$). This demonstrates that product returns practices have a significant effect on performance in food and beverage industry in Kenya. Otherwise put, the role of product returns practices in determining the value chain performance in the food and beverage industry in Kenya cannot be ignored. In conclusion, we reject the null hypothesis H_{04} : Product return does not have a significant effect on value chain performance in the food and beverage industry in Kenya.

H₀₅: Consumer Involvement does not have any moderating effect on the relationship between reverse logistics practices and value chain performance in the food and beverage industry in Kenya.

The null hypothesis was that Consumer Involvement does not have any moderating effect on the relationship between reverse logistics practices and value chain performance in the food and beverage industry in Kenya. Results in Table 4.34 indicates that p-value (0.010) was less than the convectional p-value ($p=0.05$). This demonstrates that Consumer Involvement have moderating effect on the relationship between reverse logistics practices and value chain performance in the food and beverage industry in Kenya. Otherwise put, the role of consumer involvement in moderating the relationship between reverse logistics practices and value chain performance in the food and beverage industry in Kenya cannot be ignored. In conclusion, we reject the null hypothesis H₀₅: Consumer Involvement does not have any moderating effect on the relationship between reverse logistics practices and value chain performance in the food and beverage industry in Kenya.

4.10.1 Summary of Hypotheses

This section presents the summary of hypotheses testing of the study variables. The existing rule of thumb is to reject the null hypothesis if the predictor variable had a statistically significant relationship with the criterion variable. The significance level was tested at a critical p-value of 0.05

Table 4. 1: Summary of Hypotheses Testing and Discussion

S/No	Objective	Hypothesis	Rule	P-Value Overall	Comment
1.	To establish the role of recycling practices on value chain performance in the food and beverage industry in Kenya.	H ₀₁ : Recycling does not have a significant effect on value chain performance in the food and beverage industry in Kenya.	Reject H ₀₁ if p value for all recycling items are p<.05	p=0.000	The null hypothesis was rejected; therefore recycling practices influence the value chain performance of Food and Beverage industry in Kenya
2.	To assess the influence of reusing practices on value chain performance in the food and beverage industry in Kenya.	H ₀₂ : Reusing of products does not have a significant effect on value chain performance in the food and beverage industry in Kenya.	Reject H ₀₂ if p value for all reusing items are p<.05	p=0.130	The researcher failed to reject the null hypothesis; therefore reusing has no influence on value chain performance of Food and Beverage industry in Kenya
3.	To determine the role of remanufacturing practices on value chain performance in the food and beverage industry in Kenya.	H ₀₃ : Remanufacturing does not have a significant effect on value chain performance in the food and beverage industry in Kenya.	Reject H ₀₃ if p value for all remanufacturing items are p<.05	p=0.000	The null hypothesis was rejected; therefore remanufacturing practices influence the value chain performance of Food and Beverage industry in Kenya
4.	To examine the influence of product returns on value chain performance in the food and beverage industry in Kenya.	H ₀₄ : Product return does not have a significant effect on value chain performance in the food and beverage industry in Kenya.	Reject H ₀₄ if p value for all remanufacturing items are p<.05	p=0.000	The null hypothesis was rejected; therefore product returns practices influence the value chain performance of Food and Beverage industry in Kenya
5.	To determine the role of consumer involvement on value chain performance in the food and beverage industry in Kenya.	Consumer Involvement does not have any moderating effect on the relationship between reverse logistics practices and value chain performance in the food and beverage industry in Kenya.	Reject H ₀₄ if p value for all remanufacturing items are p<.05	p=0.010	The null hypothesis was rejected; Consumer Involvement has a moderating effect on the relationship between reverse logistics practices and value chain performance of Food and Beverage industry in Kenya

4.11 Optimal Model

Based on the above results, model optimization was conducted. The purpose of the model optimization was to provide a guide on the deriving the final model/optimal model (revised conceptual framework where only statistically significant values are included for purposes of objectivity. The independent variable number 2; reusing and the moderator variable consumer involvement were dropped. Reusing was dropped because although it was significant, it had a reducing effect on value chain performance of the food and beverage industry. Similarly, though the moderator variable was significant, it was dropped because it had a reducing moderating effect on the relationship between reverse logistics practices and value chain performance of food and beverage industry in Kenya. An optimal model is the model that yields the best output.

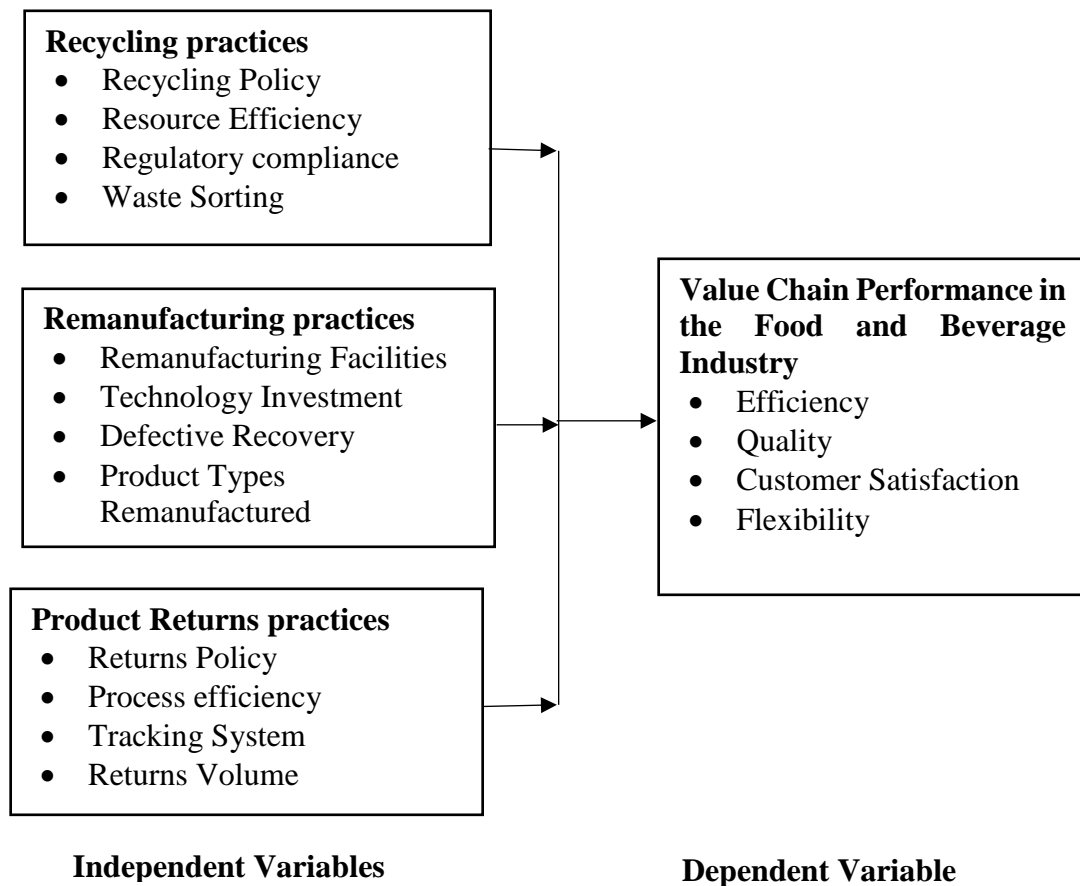


Figure 4.7: Optimal Model

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents a summary of the research findings based on the research objectives, as well as conclusions, recommendations, and suggestions for future studies. The main purpose of this study was to determine the role of reverse logistics practices and value chain performance in the food and beverage industry in Kenya. The specific objectives of this study were; to establish the role of recycling practices and value chain performance in the food and beverage industry, to assess the influence of reusing practices and value chain performance in the food and beverage industry, to determine the role of remanufacturing practices and value chain performance in the food and beverage industry, to examine the influence of product returns and value chain performance in the food and beverage industry and to determine the moderating effect of consumer involvement on value chain performance in the food and beverage industry.

5.2 Summary of Findings

The study's summary is presented in this section, focusing on determining the role of reverse logistics practices on value chain performance in the food and beverage industry in Kenya in Kenya per a specific objective.

5.2.1 Recycling Practices and Value Chain Performance

The first specific objective sought to establish the role of recycling practices and value chain performance in the food and beverage industry in Kenya. According to the study, most of the food and beverage firms in the industry that are implementing recycling practices are doing so as a way of reducing the operational costs and optimizing value chain performance. The research found that the firms that implement recycling practices in their organizations have greatly reduced their usage of virgin materials such as raw materials and water. This reduction in usage of virgin materials in turn reduces the

emissions to the environment which further ensures that firms are complying with the regulations that have been set in order to safeguard the environment. However, some organizations stated that they faced a great challenge in implementation of recycling practices because changing of the existing policies in the organization takes a long time and requires a lot of restructuring of their processes thereby acting as a barrier to the implementation of reverse logistics practices to most organizations. Organizations that managed to overcome this barrier enjoyed greatly reduced costs in their value chains and improved efficiency. This study also discovered that recycling practices and value chain performance of food and beverage industry in Kenya had a positive and statistically significant relationship.

5.2.2 Reusing Practices and Value Chain Performance

The second specific objective sought to assess the influence of reusing practices and value chain performance in the food and beverage industry in Kenya. The findings of the study indicated that some of the firms in the food and beverage industry have reusable packages in their value chains. This in turn has led to significant cost reduction especially after the involvement of consumers and suppliers in the implementation of the reusing of the packaging materials. Some firms also stated that they reuse materials in order to gain competitive advantage over their competitors. Other firms are having a challenge in the implementation of reusing practices due to lack of awareness on how to integrate other stakeholders in their value chains into the reusing practices. Similarly, other firms stated that their products cannot be reused once they get to the consumer thus posing a challenge in the implementation of the reusing practices in their organizations. However, the study discovered that reusing practices and value chain performance of the food and beverage industry in Kenya had a statistically significant relationship.

5.2.3 Remanufacturing Practices and Value Chain Performance

The third specific objective sought to determine the role of remanufacturing practices and value chain performance in the food and beverage industry in Kenya. The findings of the study showed that firms that implemented remanufacturing practices have led to marginal

reduction in production costs, an increase in their sales volumes and increased profit margins. This is because consumers were receptive to the purchase of items that have been remanufactured by the food and beverage companies thereby promoting their sales. Customers were also open to the purchase of remanufactured products because they look at the sustainable aspect of conserving the environment with their purchase. The study also found that the institutions that implemented remanufacturing practices were able to reduce their overall production costs and increase their sales volumes and profit margins marginally. The study also found that the organizations that implemented remanufacturing were able to introduce a large variety of products in the market within a very short time thereby giving consumers a variety of products to choose from and easily satisfying their needs. This in turn increased the organizations' competitiveness. The study discovered that remanufacturing practices and value chain performance of the food and beverage industry have a very strong positive and statistically significant relationship.

5.2.4 Product Returns and Value Chain Performance

The fourth specific objective sought to examine the influence of product return on value chain performance in the food and beverage industry in Kenya. The study findings indicated that firms in the food and beverage industry which had a favorable product returns policy tended to enjoy greater consumer satisfaction and increased efficiency in their value chains thereby improving their overall performance. The findings also indicated that consumers were more loyal to firms which had a favorable returns policy and firms which ensured they had a way of collecting products which were to be returned through their value chains. The study also found that the organizations involved carry out returns management in a bid to minimize wastage in the organization and to ensure that the organization reduces the cost of investment of virgin materials by returning the products and using the returned products as raw materials or components of new products. The study found that product returns and value chain performance had a positive and statistically significant relationship.

5.2.5 Moderating Effect of Consumer Involvement on the Relationship between Reverse Logistics Practices and Value Chain Performance

The moderating variable sought to establish the moderating effect of consumer involvement on the relationship between reverse logistics practices such as recycling practices, reusing practices, remanufacturing practices and product returns and value chain performance in the food and beverage industry in Kenya. The study found that most organizations agree on the importance of consumer involvement but they have a challenge in working with consumers due to lack of express information on the identities of the consumers and how they can access them. Therefore, the organizations find it challenging to interact with the customers and get assurance that the consumers will reverse the products into the value chain. Despite this, some organizations stated that they charge consumers a fee to ensure that they return the packages in a bid to get refunds which in turn promotes reverse logistics. The results revealed that consumer involvement had a low moderating effect on the relationship between reverse logistics practices and value chain performance in the food and beverage industry in Kenya after it was added to the model.

5.3 Conclusions

The study concluded that recycling practices, remanufacturing practices and product returns practices jointly are positively associated with the value chain performance of the firms in the food and beverage industry. On the other hand, reusing is negatively associated with the performance of the value chains in the food and beverage industry.

5.3.1 Recycling Practices and Value Chain Performance

From the study findings, it can be concluded that recycling practices had a positive significant influence on value chain performance of the firms in the food and beverage industry in Kenya. This is because an increase in a unit of recycling practices leads to an improvement of the performance of the value chains in the food and beverage industry. Thus the study concluded that most of the organizations that have implemented recycling practices in their value chains have done so in order to improve their performance. Thus the study concluded that the organizations that have a recycling policy and correctly

implement it improve the performance of their value chains. The study also concluded that reusing of waste water in their organization greatly decreased their utility usage in their organizations thereby boosting efficiency of their value chains as there is plenty of water to be used during their manufacturing processes. The study also found that recycling practices reduced emissions and generation of waste which is in tandem with the regulations and legislation on environmental conservation and reduction of waste disposal into the environment.

5.3.2 Reusing Practices and Value Chain Performance

From the study findings, it can be concluded that reusing practices had a negative significant influence on value chain performance of the firms in the food and beverage industry in Kenya. This is because an increase in a unit of recycling practices leads to a decline in the performance of the value chains in the food and beverage industry. This was because most organizations who implemented reusing practices in their value chains made packages that could be reused for other purposes by the final consumer rather than encouraging reversal of these products to the manufacturing organization for reuse. The study also concluded that the firms in the food and beverage industry which have paid attention to reusing practices at the production level enjoy reduced costs of inventory due to the reduction in purchase cost of new materials for use to satisfy consumer needs. The study also concluded that a majority of the organizations in the food and beverage industry are unable to reuse their products because once consumed, the reversal process becomes difficult. Therefore, the major components for reuse in the food and beverage industry are the packages.

5.3.3 Remanufacturing Practices and Value Chain Performance

From the study findings, it can be concluded that remanufacturing practices had a positive significant influence on value chain performance of the firms in the food and beverage industry in Kenya. This is because an increase in a unit of remanufacturing practices leads to an improvement of the performance of the value chains in the food and beverage industry. The findings indicated that remanufacturing enables a firm to produce a large

variety of products to the market within a very short time therefore increasing efficiency of their value chains as there will always be enough items in the market to satisfy customer needs without having a shortage. The study also concluded that due to the remanufacturing of used products, the organization reduces their production costs, increases their sales volumes and their profit margins substantially thereby proving the efficiency of their value chains. The study also concluded that through remanufacturing, the firms are able to offer a wider variety of products in their portfolio thereby improving their competitiveness in the market.

5.3.4 Product Returns and Value Chain Performance

From the study findings, it can be concluded that product returns practices had a positive significant influence on value chain performance of the firms in the food and beverage industry in Kenya. This is because an increase in a unit of product returns practices leads to an improvement of the performance of the value chains in the food and beverage industry. The findings concluded that organizations which have a favorable product returns policy for their consumers tend to instigate better customer loyalty because consumers tend to be comfortable purchasing from an organization with the option of returning the products in case the products do not satisfy their needs. The study also concluded that syncing the product returns process with the existing value chain improves its performance. The study also concluded that capacity building on the importance of returns management improves the performance of the value chain and also minimizes wastage that could be incurred if the products returned are not managed well.

5.3.5 Consumer Involvement

The study findings revealed that consumer involvement has a low moderating effect on the relationship between reverse logistics practices and value chain performance of the food and beverage industry in Kenya. The study concluded that consumer involvement has a low effect on the relationship between reverse logistics practices and value chain performance in the food and beverage industry in Kenya. This is because, despite the firms in the food and beverage industry accepting the importance of consumer involvement in

ensuring reverse logistics processes in the value chains are successful, they find it challenging to access the final consumer and motivate them to return the products back to their organization for recycling. The study concluded that those organizations which offer their consumers financial awards in order to motivate them to adopt sustainable value chain practices enjoy better success rather than those who call to the consumers to embrace reverse logistics without any financial benefits.

5.3.6 Value Chain Performance

The study findings revealed that out of 291 firms in the food and beverage industry in Kenya, only 90 firms are implementing reverse logistics practices in their organization. Therefore, the study concluded that many of the firms are not successfully optimizing their value chains due to lack of implementation of the reverse logistics practices. The study also concluded that the organizations that have implemented various reverse logistics practices enjoy decreased transaction, production and inventory carrying costs in their value chains and increased profit margins thereby showing increased efficiency. The study also concluded that reduced number of complaints and standardization in the quality of the products indicated good quality of products for the customers which showed an improvement in the performance of the value chains. The study also concluded that an increase in the order fill rate, a reduction in the lead times for delivery of products and a decrease in product delays and shipping errors indicates responsiveness in the value chain which shows improvement in its performance.

5.4 Recommendations

The study sought to examine the influence of reverse logistics practices on value chain performance in the food and beverage industry in Kenya, with a view of making recommendations to scholars, researchers, the food and beverage industry and policy makers. The study recommendations are in line with the objectives, findings and conclusions of the study.

5.4.1 Recycling Practices

The study recommends that the firms in the food and beverage industry in Kenya who are yet to adopt recycling policies within their organization and to implement recycling practices should assess their value chains and discover the ways in which they can implement them in order to improve efficiency and effectiveness in the processes. The study also recommends that waste recycling should be embraced in order to reduce the use of water and the release of pollutants to the environment which creates various opportunities for the organization and shows their willingness to conserve the environment for future generations. This in turn increases their brand visibility and consumer base especially since consumers are becoming aware of the importance of environmental conservation and are purchasing from organizations championing sustainability.

5.4.2 Reusing Practices

The study recommends that the manufacturing firms in the food and beverage industry should manufacture and embrace reusable packaging material, recyclable packaging material, non-hazardous packaging material, bio-degradable packaging material, reduced packaging material and low- density packaging material. This is because if the packaging materials are manufactured for reuse then it becomes easy to reuse them in the value chains. The government, through the ministry of environment and forestry, banned use of polythene bags across the country. The study therefore recommended that the food and beverage manufacturing firms should back this initiative by reducing polythene usage in their packaging and other value chain processes. Management can also develop policies and procedures to help organizations maintain stronger and better ties with their vendors.

5.4.3 Remanufacturing Practices

The study recommends that organizations in the food and beverage industry in Kenya should embrace remanufacturing so as to enhance water conservation during manufacturing, reduced generation of hazardous wastes, reduction of wastes during manufacturing, full capacity utilization and cleaner production strategies. This will enable

them to cut down on the cost of production and further comply with any legislations governing the manufacturing sector in the Kenyan and international context. The study also recommended that organizations should implement remanufacturing which will enable them to introduce a large variety of products in the market within a very short time thereby giving consumers a variety of products to choose from and easily satisfying their needs in turn increasing their competitiveness.

5.4.4 Product Returns

The study recommends that firms in the food and beverage industry develop and implement favorable product return policies as a way of enhancing consumer satisfaction, strengthening value chain efficiency, and improving overall organizational performance. To foster consumer loyalty, firms should adopt return-friendly practices that are transparent, convenient, and fair, while also establishing efficient collection mechanisms within their value chains to ensure smooth retrieval of returned products. The study further recommended that organizations should adopt structured returns management systems designed to minimize wastage and improve resource utilization. The study also recommended that organizations should promote the reuse of returned products as raw materials or components in production processes, thereby reducing reliance on virgin materials and lowering production costs. Overall, firms are advised to leverage product returns as a strategic driver of value chain performance, given the positive and significant relationship observed between effective returns management and organizational outcomes.

5.4.5 Consumer Involvement

The study recommended that firms in the food and beverage industry should develop clearer systems for accessing and engaging consumers, including the establishment of reliable communication channels and mechanisms for identifying and tracking customers. This is because strengthening consumer interaction will enable organizations to secure greater assurance that returned products are reintegrated into the value chain. The study further recommended that firms should expand the use of incentive-based approaches,

such as deposit–refund schemes, to encourage consumers to return packaging and other products for reuse or recycling. By institutionalizing such practices, organizations can overcome existing barriers to consumer participation and enhance the contribution of consumer involvement to the effectiveness of reverse logistics and overall value chain performance.

5.4.6 Value Chain Performance

The study recommended that firms in the food and beverage industry continue to strengthen and expand the implementation of reverse logistics practices, as these contribute to reducing transaction, production, and inventory carrying costs while improving profit margins and overall efficiency within the value chain. The study also recommended that organizations should also prioritize measures that enhance product quality, such as reducing the number of consumer complaints and standardizing processes to ensure consistent quality, thereby improving customer satisfaction and value chain performance. The study also recommends that firms are encouraged to improve their responsiveness by increasing order fill rates, shortening delivery lead times, and minimizing product delays and shipping errors. By embedding these practices into their operations, organizations can achieve greater efficiency, quality, and responsiveness, ultimately enhancing the overall performance of their value chains.

5.4.7 Contribution to New Knowledge and Theory

This study will serve as a reference point for organizations which want to adopt or have adopted and implemented reverse logistics practices in their value chains. During the research it was noted that a majority of the existing studies focused on the adoption of reverse logistics practices rather than the implementation. Additionally, the studies adopted different research methodologies, models and data analysis methods that varied and resulted in inconsistencies in the research findings. This study adopting a descriptive research design allowed for a more comprehensive analyses to avoid the shortcomings, constraints and inconsistencies suffered in existing studies. Lastly, this study contributes to the literature of existing theories thus refining and reinforcing them. The study is

incognizant of the importance of archiving of data collected and used in scientific research for future replication and repurposing as research builds on knowledge and supports existing knowledge with proven facts.

5.5 Areas for Further Research

Though this study was in-depth, it was not exhaustive by any means hence it is necessary that another study should be replicated in other sectors of the manufacturing industry and the economy, such as commercial/private and public sectors. This research was based on reverse logistics practices and value chain performance on the food and beverage industry in Kenya and there is a need to undertake similar studies in retail or commercial sector to uncover the underlying relationships between reverse logistics practices and value chain performance and the findings may identify interesting comparisons. Such studies may validate, support or contradict the findings of this particular study. The study focused on four reverse logistics practices including recycling, reusing, remanufacturing and product returns. Therefore, other studies could focus on other reverse logistics practices such as refurbishing. Furthermore, future studies may consider other moderating variables apart from consumer involvement such as regulatory policies and organizational size among others. Similarly, the data was purposefully collected from single informant representatives of each participating food and beverage organization. This study recommends, improving the data through conducting a similar research from multiple informant groups such as supply chain managers and procurement managers among others, to come up with a variety of outcomes by creating discussions among respondents with different skills, experiences and motivation. Future studies could also conduct a comparative study using a different research methodology and models to determine whether the results would be somewhat different.

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APPENDICES

Appendix I: Introduction Letter

Date:

DACHA VENESSA WHITNEY

P. O. BOX 20791-00202

Nairobi.

Dear Sir/Madam,

A RESEARCH PROPOSAL IN PARTIAL FULFILLMENT OF DOCTOR OF
PHILOSOPHY DEGREE IN SUPPLY CHAIN MANAGEMENT AT JOMO
KENYATTA UNIVERSITY OF AGRICULTURE AND TECHNOLOGY

In reference to the above subject matter, I request to carry out a study in your organization. I am a doctorate student in Jomo Kenyatta University of Agriculture and Technology currently undertaking a study that seeks to analyze **“Reverse Logistics Practices and Value Chain Performance in the Food and Beverage Industry in Kenya.”**

The study is an academic research and the information obtained through the questionnaire will be treated with confidentiality and will not be used for any other purpose other than academic.

I would be grateful if you could spare some time and complete the questionnaire.

Thank you for your cooperation

Yours faithfully

DACHA VENESSA WHITNEY

PhD Student JKUAT

Appendix II: Questionnaire

Dear Respondent,

I am a student at Jomo Kenyatta University of Agriculture and Technology, School of Business and Entrepreneurship. I am carrying out a study on **Reverse Logistics Practices and Value Chain Performance in the Food and Beverage Industry**. The information you will provide shall be treated with utmost confidentiality and it is purely for academic purposes **ONLY**. (Please tick (√) where appropriate).

REVERSE LOGISTICS PRACTICES

PART A: RECYCLING PRACTICES

On a scale of 1-5 (where 1 means strongly disagree) and 5 means (strongly agree) express the extent to which you agree or disagree with the following statements as concerns Recycling practices.

Statements	1.Strongly disagree	2.Disagree	3.Neutral	4. Agree	5.Strongly agree
Our organization has established clear recycling policies for packaging and waste materials.					
Waste water is purified and reused in different operational systems					
There is an impact on utility usage during recycling i.e volume of power and water consumption					
There is a change in emission and waste generation					
Our organization is able to recycle and recover the value of more than half of the goods reversed by our clients					

PART B: REUSING PRACTICES

On a scale of 1-5 (where 1 means strongly disagree) and 5 means (strongly agree) express the extent to which you agree or disagree with the following statements as concerns reusing practices.

Statements	1.Strongly disagree	2.Disagree	3.Neutral	4. Agree	5.Strongly agree
Firm uses packaging materials that can be reused for other purposes					
Firm encourages distributors and customers to return used products for reuse.					
We provide technical support to our distributors and agents to improve reusability of items					
Our organization has a round trip system to ensure the return of items					
The reuse of items in production impacts the cost of inventory					
The organizations reuses items in a bid to be more competitive in the market					

PART C: REMANUFACTURING PRACTICES

On a scale of 1-5 (where 1 means strongly disagree) and 5 means (strongly agree) express the extent to which you agree or disagree with the following statements as concerns remanufacturing practices.

Statements	1.Strongly disagree	2.Disagree	3.Neutral	4. Agree	5.Strongly agree
Remanufacturing boosts our organizations value chain					
Remanufacturing helps our organization to manage our production costs					
Our company sales volumes have been impacted by remanufacturing					

Through successful remanufacturing our organization is able to raise our profit margins substantially					
Our organization is able to produce a large variety of products in the market within a very short time					
Remanufacturing impacts our organizations competitiveness in the market					

PART D: PRODUCT RETURNS

On a scale of 1-5 (where 1 means strongly disagree) and 5 means (strongly agree) express the extent to which you agree or disagree with the following statements as concerns product recovery practices.

	1.Strongly disagree	2.Disagree	3.Neutral	4. Agree	5.Strongly agree
Our organization has a return policy that is favorable to the consumers					
The product returns system is synced with the supply chain network					
Product returns impacts the level of customer fulfilment					
We use a time based turnaround strategy to measure product returns performance					
Our organization employs returns management to minimize wastage					
We conduct regular capacity building on returns management to enhance productivity					

PART E: CONSUMER INVOLVEMENT AS A MODERATING VARIABLE

On a scale of 1-5 (where 1 means strongly disagree) and 5 means (strongly agree) express the extent to which you agree or disagree with the following statements as concerns product recovery practices.

Statements	1.Strongly disagree	2.Disagree	3.Neutral	4. Agree	5.Strongly agree
Our organization makes arrangements with clients outside the distribution areas on the costs of product retrieval					
Well managed product reversals in our firm impacts the value to our customers					
Our consumers manage resource use in our organization through returning used products					
Our consumers support our reverse logistics practices by purchasing our recycled/remanufactured products					
Our organizations' value chain creates awareness to our consumers on the importance of reverse logistics					
Our organization provides financial awards to customers who adopt sustainable value chain practices such as reverse logistics					

SECTION C: VALUE CHAIN PERFORMANCE IN THE FOOD AND BEVERAGE INDUSTRY IN KENYA.

Indicate to what extent your firm has added value to the supply chain processes as a result of adopting reverse logistics practices by ticking where appropriate.

Value Chain Performance Measures	1.Strongly disagree	2.Disagree	3.Neutral	4. Agree	5.Strongly agree
Efficiency					
Our organization has experienced a fluctuation in transaction costs throughout the value chain					
Our production costs have changed over time throughout the value chain					
Our organization is profitable					
Our profit margins have changed steadily over the years					
Our organization has experienced a shrinkage in our inventory carrying costs					
Quality					
Our products are safe for use by our consumers					
Our products have a prolonged shelf life to cater for safe consumption by our consumers					
The quality of our products is standard and consistent					
Our products are convenient and easy to use by consumers					
Our organization receives a marginal number of customer complaints					
Degree of Responsiveness					
Our organizations' order fill rate has shifted over the years					
Our organization has changed lead times for delivery of products					
There is a change in product delays along our organizations' value chain					
There is a decline in shipping errors along our organizations' value chain					

Our organization handles customer complaints in time					
Flexibility					
Our organization is able to satisfy our customer's needs					
Our organization is able to vary delivery time according to demand					
Our organization is able to vary production should there be a change in demand					
Our organization is able to recover lost sales					

THANK YOU

Appendix III: List of the Food and Beverage Companies in Kenya Implementing Reverse Logistics

1. 254 Brewing Co
2. Aberdare Maize Millers
3. Aberdares Water Ltd (Aberdares Water)
4. African Oasis Spring Water Ltd (Oasis Spring water)
5. ALPHA GRAIN MILLERS
6. Alpine Coolers
7. American Bottling Ltd (Lyro Water)
8. Aqua Pack Coolers
9. Aquamist LTD
10. Aquapure Mineral Water
11. Aquasal Ltd
12. Aviano East Africa
13. Baraka Flour Mills
14. Bila Shaka
15. BRAVA Food Industries LTD
16. British American Tobacco
17. Capwell Industries Ltd
18. Classic Spring Mineral Water
19. Coca Cola Beverages Africa
20. Cool Breeze Agencies Ltd
21. County Bottlers Limited
22. Crystal Bottlers
23. Devlin Ultimate Springs LTD
24. East Africa Breweries LTD
25. East African Malts
26. Eastern Flour Mills Ltd
27. FLAMINGO GRAIN MILLERS LTD
28. Gambino Bottling Ltd (Aquadrop Purified Drinking Water)
29. Giant Millers Limited

30. Glacier Springs Ltd
31. Golden Harvest Mills
32. Grain Industries Limited
33. Grange Park Mineral Water
34. Highlands Mineral Water
35. JETLAK Foods LTD
36. Joy Millers
37. Kabansora Millers Ltd
38. Kamili Packers LTD
39. Kapa Oil Refineries LTD
40. Kedsta Investment LTD
41. Kenchic Ltd
42. Kentaste Products LTD
43. Kenya Wine Agencies LTD
44. Keringet Pure Natural Mineral Water
45. Keroche Industries LTD
46. Kevian Kenya
47. Kevian Kenya LTD
48. Kinangop Dairy LTD
49. Kitale Industries Ltd
50. Kitui Flour Mills Limited
51. Lake Victoria Springs Mineral Water Ltd
52. Maisha Flour Mills Ltd
53. Maize Milling Co Ltd
54. Mama Millers
55. Maseno Highland Water
56. Maycorn Maize Meal Company
57. McNeel Millers Ltd
58. Melvin Marsh International
59. Menengai Oil Refineries Ltd
60. Midrow Kenya LTD

61. Milly Fruit Processors LTD
62. Miritini Kenya LTD
63. Mombasa Maize Millers Ltd
64. Mount Kenya Breweries Ltd
65. Nairobi Bottlers LTD
66. Nairobi Flour Millers Ltd
67. Nestle Kenya Ltd
68. New Kenya Cooperative Creameries LTD
69. Orchard Juice ltd
70. OSHO GRAIN MILLERS LTD
71. Ozzbeco Kenya
72. Peafoods Processing Co
73. Pembe Flour Mills Ltd
74. Premier Flour Mills Ltd
75. Premier Food Industries
76. Prosoya Kenya Limited.
77. Pwani Oil Products
78. Rafiki Millers Ltd
79. Razco Ltd
80. Re-Suns Spices LTD
81. Rojo Vida Enterprise (Aberdare Aqua Cool)
82. Savannah Brands company
83. Sigona Enterprises Ltd
84. Soy Afric Ltd
85. Sparkle Clear Ltd
86. Uchumi Grain Millers EA Ltd
87. Unga Limited
88. United Millers Limited
89. Viva Global
90. Wow Beverages

Source: Manufacturers and Exporters Directory, 2022