# RELATIONSHIP BETWEEN REVERSE LOGISTICS PRACTICES AND ORGANIZATIONAL PERFORMANCE OF MANUFACTURING FIRMS IN KENYA

BY

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## DECLARATION

This research project is my original work and has not been submitted to any university for examination.

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This research project has been submitted for examination with my approval as the University supervisor.

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## DEDICATION

This research project is dedicated to my loving fiancée Abigael Mwashigadi, my pillar and strength.

## ABSTRACT

A growing concern to durable product manufacturers is how to manage the products they manufacture once they reach their end of life. Manufacturing industries are currently facing the challenge of complying with many regulatory requirements from various regulatory institutions. The consequences of non-compliance with the set environmental requirements can be expensive and time consuming. Reverse logistics sometimes referred to as "product take-back" is one of the concepts in the wider concept of green supply chain management that is seen as a possible solution to this. It enhances customer loyalty and service, recovers asset value faster and achieves sustainability objectives and goals. It can also result in improved brand image, better relations with stakeholders and improved personnel motivation. Though studies have shown the positive impacts of adoption of various reverse logistics practices, none has specifically shown how adoption of reuse, remanufacture and recycling reverse logistics practices could impact on organisational performance of manufacturing firms in Kenya. A descriptive cross-sectional survey study was used to provide empirical data to help address the existing research gap. The objectives of this study were to establish the extent to which manufacturing firms in Kenya have adopted reverse logistics practices and determine the relationship between reverse logistics practices adoption and organisational performance of manufacturing firms in Kenya. The study sample consisted of 75 managers of manufacturing firms selected through stratified random sampling. The managers answered questionnaire items constructed by the researcher. The inferential relationship was imputed using the ordered probit regression analysis. The findings showed that manufacturing firms in Kenya have adopted reverse logistic practices to appreciable levels. Specifically, it was seen that increased organisational performance of manufacturing firms were found to be dependent on increased adoption of remanufacture and recycling reverse logistics practices with minimal adoption of reuse reverse logistics practice. It is therefore recommended that the management of various manufacturing firms consider putting in place targeted measures intended to spur adoption of reverse logistics practices. These include ensuring that all manufacturing firms create and support an environmental department within their firms tasked with monitoring the process of adoption of reverse logistics practices. Similarly, the firms should enhance particular elements of reverse logistics practices such as generation of energy from renewable sources of energy, designing products for reuse and setting up repair workshops.

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## ABBREVIATIONS AND ACRONYMS

- EOL End of Life
- **GDP** Gross Domestic Product
- **GSCM** Green Supply Chain Management
- **ISO** International Organization for Standardization
- KAM Kenya Association of Manufacturers
- **KIPPRA** Kenya Institute for Public Policy Research and Analysis
- **NEMA** National Environment Management Authority
- NGO Non-Governmental Organization
- **RBV** Resource based view
- **RL** Reverse Logistics
- **RONA** Return on Net Assets
- **SCM** Supply Chain Management
- **SME** Small and Medium Enterprises

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#### **CHAPTER ONE: INTRODUCTION**

### **1.1 Background of the Study**

A growing concern to durable product manufacturers is how to manage the products they manufacture once they reach their end of life (EOL) (Toffel, 2004). Reverse logistics sometimes referred to as "product take-back" is one of the concepts in the wider concept of Green Supply Chain Management (GSCM) that is seen as a possible solution to this. The disposal of products is no longer a responsibility undertaken solely by its consumers. This is mainly due to a number of legislative, environmental, and economic reasons. Stringent packaging and environmental regulations are driving companies to be more accountable for residual products and also the final products, even after product sale. When firms investigate the re-manufacturability, reusability, and recyclability of their products then there will be fewer disposals. Fewer disposed products can benefit companies and the environment (Rogers & Tibben-Lembke, 2001). Conceptually, reverse logistics can promote alternate uses of resources that can be cost effective and ecologically friendly by extending products' normal life cycles (Melbin, 1995).

Several organizational theories including stakeholder theory, resource based view and institutional theory have been used to understand how organizations adopt, assimilate and develop operations strategy initiatives such as total quality management, lean manufacturing, six sigma and SCM/GSCM (Laosirihongthong, Adebanjo & Tan, 2013). The stakeholder theory argues that the organization has relationships with many constituent groups and that it can engender and maintain the support of these groups by considering and balancing their relevant interests (Clarkson, 1998; Freeman & Evan,

1991). Pressures from government agencies and national and international regulators will influence the adoption of environmentally responsible behaviour (Delmas & Toffel, 2004). In this regard, organizations have institutionalized environmental practices because of internal and external pressures as well as consequences of non-compliance with environmental imperatives (Narasimhan & Carter, 1998). The resource based view theory contends that the unique resources and capabilities of firms are the key sources of sustained competitive advantage (Lynch, Keller & Ozment, 2000).

The manufacturing sector plays a key role in Kenya's economic growth. The main goal of this sector is to increasingly contribute to Kenya's GDP by at least 10% per annum (KIPPRA, 2013). Additionally the manufacturing sector was expected to record a 10% growth in the 2008-2012 medium term period driven. This was largely driven by local markets, regional as well as global markets. The performance of the manufacturing sector in Kenya has not been without challenges. The growth and graduation of the firms in the manufacturing sector has not been realized to its fullest potential due to various factors such as high cost of credit due to the high cost of raw materials, restrictive legislation in relation to environmental regulation in accordance with effluence emission or disposal and inability for industries to meet ISO 14001environmental certification and ISO 9001 product quality standards limits their product qualities and efficiencies. This makes consumers distrust these organizations and their products and/or services (Zhu & Sarkis, 2004).

#### **1.1.1 Reverse Logistics**

Reverse logistics is a process where a manufacturer accepts previously shipped products from the point of consumption for possible recycling and re-manufacturing (Fortes, 2009). It is the process of retrieving the product from the end consumer for the purposes of capturing value or proper disposal. Activities include collection, combined inspection/selection/sorting, re-processing/direct recovery, redistribution, and disposal (Ninlawan, Seksan, Tossapol & Pilada, 2010).

There are many reasons and benefits to organizations for implementing reverse logistics practices which include legislative as well as many market and non-market factors. All over the world, manufacturers of carpets, batteries, automotive parts, packaging, tires and electronic products have initiated voluntary reverse logistics programs. This is because manufacturers are increasingly becoming aware of the profit opportunities afforded by remanufacturing. At the same time remanufacturing also provides feedback to the organization on the market performance of its product in terms of its failure modes and durability which enhances the brand reputation. In a nutshell therefore, reverse logistics provides several benefits to manufacturers, some of which include; reducing production costs, promoting an image of environmental responsibility, meeting customer demands, protecting aftermarkets to deter independent firms (external entrants) from remanufacturing and selling organization's product thus preventing losses of both market share and brand image and finally pre-empting regulation whose consequences of non-compliance would be huge financial penalties (Laosirihongthong et al., 2013).

As much as reverse logistics is seen as a suitable solution to the environmental concerns of manufacturing organizations, there are several disadvantages to it as stated by (Tibben-Lembke, 2002). Firstly, Products recovery investments are capital intensive. End of life product recovery requires heavy investment in various types of equipment and training to extract valuable components. Secondly, reverse supply chains associated with product recovery are subject to much more uncertainty than forward supply chains due to the uncertain timing and quantity of returns and the need to balance demands with returns (Toffel, 2004).

#### **1.1.2 Organizational Performance**

Organizational performance is the analysis of the actual results or output of an organization measured against its intended outputs. According to Richard, Devinney, Yip and Johnson (2009) organizational performance encompasses three specific areas of firm outcomes: financial performance (profits, return on assets, return on investment.); product market performance (sales, market share.); and shareholder return (total shareholder return, economic value added.)

A key performance indicator is a quantifiable measure a company uses to determine how well it meets the set organizational goals. Using financial indicators in business performance measurement allows an organization to compare different business types. An organization can define its own operating objectives and use them to evaluate their performance. Some of the measures it can use include: Activity ratios evaluate how efficiently the company manages its business. The asset turnover measures how effectively the company puts its assets to work. The inventory turnover evaluates how efficiently the company manages its inventory. A higher turnover means better performance for both ratios. Value added is calculated as the difference between the operating result and the cost of capital of the average net assets. Alternatively, the value added can be determined by using the main value drivers: return on sales and net assets' Return on sales is of particular importance for assessing profitability. The combination of return on sales and net assets' productivity results in return on net assets (RONA). If RONA exceeds the cost of capital, value is created for our shareholders (Huselid, 1995).

Marketing performance indicators show how an organization's product is performing in the market. Some of the key market performance indicators employed by firms include; the status of existing customers. A well performing product would have a sizeable number of loyal customers and would keep attracting new customers as well. The waiting time for customer orders is also a good indicator of product performance in the market. Well performing products have regular orders as has been generally observed. The length of stock-outs is another good performance indicator. A stock out is an event that causes inventory to be exhausted. This is usually an indicator of the high demand of the product. In this study, the role of reverse logistics on organizational performance will be determined. The marketing and financial aspects will be assessed in view of reverse logistics (Vorhies & Morgan, 2003).

#### **1.1.3 Reverse Logistics and Organizational Performance**

Organizations give importance to reverse logistics aspect mainly due to three reasons (Srivastava & Srivastava, 2006) the growing importance of environmental issues and their impact on public opinion (De Brito, Dekker & Flapper 2005), the benefits that the company gains by improving their return processes such as image enhancement, improved market share, it allows getting new profits (Stokes & Clegg, 2002; De Brito et al., 2005) and the new and growing environmental regulations (Stokes & Clegg, 2002; De Brito et al., 2005).

Some organizations have discovered that components and materials from end of life durable products can often be refurbished to substitute for new parts to be used as spares or in remanufacturing. For instance, Xerox Corporation saves hundreds of millions of dollars a year by disassembling its end of life photocopiers and recycling usable materials. Mercedes–Benz accepts and disassembles end of life Mercedes vehicles to remove and sell spare parts to both consumers and commercial customers at a significant discount. In the world today, organizations that enact product recovery programs, greatly enhancing the image of their brand, are the leading firms in their various industries. Increasing the use of recyclable materials and becoming an industry leader in developing environmentally sustainable business practices were perceived as having the greatest positive influence. All this can be done by implementing a reverse logistics program (Laosirihongthong et al., 2013).

Many organizations the world over have been forced to adopt reverse logistics practices in order to conform to set environmental regulations. Recently however, several voluntary reverse logistics programs have been adopted by organizations in order to reduce the pressure for new or expanded legislation. Many organizations have tried to improve their own performance and others by having their industry association impose more stringent requirements on its entire membership. This is all in a bid to avoid the consequences of non-compliance which include heavy financial penalties and / or withdrawal of licenses (Eltayeb, Zailani & Ramayan, 2011).

#### 1.1.4 Manufacturing Sector in Kenya

According to the KIPPRA report (2013), manufacturing sector makes an important contribution to the Kenyan economy and currently employs 277,900 people, which represents 13% of labour force in the formal sector with an additional 1.6 million people employed in the informal side of the industry. Nearly 50% of manufacturing firms in Kenya employ 50 or more workers.

The sector comprises of about 3,700 manufacturing units and is divided into several broad sub-sectors. KAM has classified manufacturing sector into categories identified as: Building, Construction & Mining, Chemical & Allied, Electrical & Electronics, Food Beverages & Tobacco, Leather & Footwear, Metal & Allied, Motor Vehicle & Accessories, Paper & Board, Pharmaceutical & Medical Equipment, Plastics & Rubber, Textiles & Apparels, Timber, Wood Products & Furniture, Consultancy & Industrial Services and SME Focal Point (KAM, 2014).

The sector is mainly agro-based and characterized by relatively low value addition, employment, and capacity utilization and export volumes partly due to weak linkages to other sectors. The top three manufacturing subsectors account for 50% of the sector GDP, 50% of exports, and 60% of formal employment. Overall, manufacturing contributes 10% to GDP. The bulk of Kenya's manufactured goods (95%) are basic products such as food, beverages, building materials and basic chemicals. Only 5% of manufactured items, such as pharmaceuticals, are in skill-intensive activities (KIPPRA, 2013).

The manufacturing sector has faced various challenges when it comes to environmental concerns. Manufacturing industries are currently facing the challenge of complying with many regulatory requirements from various regulatory institutions (KAM, 2014). The consequences of non-compliance with the set environmental requirements can be expensive and time consuming. Cement manufacturer Bamburi Cement in Mombasa has had to grapple with the problem of court cases due to emission of poisonous gases from their factory. Many chemical manufacturers have faced similar brushes with the law due to water pollution. Such events make consumers distrust these organizations and their products and/or services (Zhu, Sarkis, & Geng, 2005).

Manufacturing firms contribute to the environmental pollution in various ways: they generate air and/or water emissions, which include particle or chemical-filled smoke, ash and particles and chemicals that seep into ground water through run-off; use raw materials that are natural, such as wood. Laws and good environmental citizenship require that the business take measures to replace what it uses; the manufacturing process

manufactures waste. Environmental laws and good environmental citizenship prohibit the indiscriminate dumping of manufacturing by product, so manufacturers must decide how best to dispense their waste. (Zhu et al., 2005)

As a consequence of both fast depletion of the raw materials and an increasing amount of different forms of waste (solid waste, air and water pollution), two commonly accepted primary objectives have been gaining momentum: create environmentally friendly products, (green products); and develop techniques for product recovery and waste management (reverse logistics), (Eltayeb et al., 2011).

## **1.2 Research Problem**

Reverse Logistics enhances customer loyalty and service, recovers asset value faster and achieves sustainability objectives and goals. It can result in improved brand image, better relations with stakeholders and improved personnel motivation (Testa & Iraldo, 2010; Xie & Breen, 2012). However, adoption of reverse logistics requires substantial capital investment for it to be meaningful. It requires the use of various types of equipment and training to reduce the cost of assessing, disassembling or identifying valuable components in end of life products. These are set up costs that organizations have to incur in implementing reverse logistics practices and have a significant effect on the organization's profitability (Azevedo, Carvalho & Cruz Machado, 2011).

The manufacturing industry is a fast growing sector in developing countries, Kenya included. In Kenya, the sector contributes over 10% to the GDP according to the 2014-

2015 national budgets. However, high cost of production and often low quality of raw materials has become a major problem for leading manufacturers in the country. This, it is alleged, has made some players in the sector to implement a number of cost cutting measures some of which border on contravening internationally recognized best practices. Thus, chemical manufacturers in the country for instance are now forced to operate under quite rigorous and strict environmental regulations and legislation due to the effect of their effluence to water bodies. Similarly, the Government of Kenya in 2009 was forced to ban the use of all plastic bags due to their adverse effects on the environment which had a negative ripple effect on plastic manufacturers as well as supermarkets across the country (KAM, 2014). This study sees reverse logistics as a possible cure to these challenges.

Empirical evidence adduced shows that researchers such as Eltayeb et al. (2011), Rao and Holt (2005), De Giovanni and Vinzi (2012), Green et al. (2011) and Azevedo et al. (2011) have attempted to link adoption of reverse logistics practices to organizational performance. According to their research findings, Rao and Holt (2005) showed that there exists a positive relationship between reverse logistics practices and organizational performance, De Giovanni and Vinzi (2012) established that the existing relationship was not significant while Azevedo et al. (2011) found a combination of positive relationship as well as other relationships. Thus, globally, evidence from the literature show a lack of consensus on the impact of reverse logistics on organizational performance.

Locally, there are number of studies that have focused on reverse logistics practices. For

instance, Ongombe (2012) studied the relationship between reverse logistics and the competitive advantage it has on an organization with specific focus being on the water bottling companies in Nairobi. The results of his research study showed that there is indeed a positive relationship between the two variables. Langat (2012), looked at reverse supply chain management practices in large scale manufacturing companies in Nairobi, Gitau (2012), focused on the effects of reverse logistics on performance of East Africa Breweries, while Waithaka (2012), looked at reverse logistics practices at Kenya Medical Supply Agency.

None of these studies apart from that of Serut (2013) focused specifically on the relationship between adoption of reverse logistics and organisational performance of manufacturing firms in the country. However, even Serut's study differs from this study in terms of operationalization of reverse logistics variables. While it focussed reverse logistics as a variable, this study breaks down reverse logistics practices into three: remanufacture, recycle and reuse variables. Secondly, Serut dwelt mostly on the financial aspect of organizational performance. In addition to financial performance, this study also considers market performance as a factor that contributes to organisational performance. The third difference stems from the statistical tool of analysis. While Serut used regression analysis, this study employs the ordered probit model as advocated by Greene and Hensher (2003) in cases where the dependent variable is ordinal. The question that arises is; what is the effect of reverse logistics practices on organizational performance of manufacturing firms in Kenya?

### **1.3 Research Objective**

The general objective was to determine the relationship between reverse logistics practices and organizational performance. The specific objectives for this study were to:

- (i) Establish the extent to which manufacturing firms in Kenya have adopted reverse logistics practices.
- (ii) Determine the relationship between reverse logistics practices adoption and organizational performance of manufacturing firms in Kenya.

## **1.4 Value of the Study**

The findings of this study will act as a guide for the management in manufacturing firms in Kenya in understanding the role that reverse logistics plays in their organization's performance. They will need to learn and understand the environmental standards and regulations that govern their industry. Manufacturing firms will also get to know the expectations of some of their clients in terms of environmental responsibility.

Academicians will use the findings of this study as a preamble for further research studies in the field of reverse logistics. It will act as basis from which future researchers can draw ideas. It will form a source of understanding of the extent to which reverse logistics has been adopted in developing countries.

Policy makers will find the study useful in their decision making process with regard to enforcing legislature that promotes adoption of reverse logistics in manufacturing industries. The government can also learn guidelines of how to come up with environmental legislation that is responsible and enforceable. Other beneficiaries to the research findings are organizations such as NEMA and Kenya Association of Manufacturers. The findings will help these bodies come up with strategies that will see the adoption of reverse logistics in manufacturing firms that are yet to adopt the practice.

## **CHAPTER TWO: LITERATURE REVIEW**

#### **2.1 Introduction**

This chapter reviews literature related to the study under the following sub titles: theoretical review, reverse logistics practices, empirical review, relationship between reverse logistics and operational performance.

## 2.2 Theoretical Foundation of the Study

This study is anchored on three organizational theories that have been used to understand how companies adopt and develop reverse logistics practices. The three theories are the stakeholder theory, the Resource based view and the institutional theory.

#### 2.2.1 Stakeholder Theory

The stakeholder theory argues that the organization has relationships with many constituent groups and that it can engender and maintain the support of these groups by considering and balancing their relevant interests (Clarkson, 1998; Freeman & Evan, 1991; Jones & Wicks, 1999). As it has been noted by many, the theory fosters both instrumental predictions and normative prescriptions (Hasnas, 1998). This has therefore proven to be a subject of interest with those interested in profits as well as those interested in issues of ethics.

Stakeholder theory is a theory that looks at the relationships between an organization and its internal and external environment, how these relationships affect the organization's mode of conducting its activities. Examples of stakeholders of a business include suppliers, customers, stockholders, employees, government, non-profit community organizations, and the local community among others. Increasingly, concerned citizens world-wide have reacted to threats of environmental depletion and urged both government and businesses to respond to these issues. This has led to increased demand for 'green' products and calls for more stringent regulations on environmental pollution (Delmas & Toffel, 2004).

An organization can take either a proactive or reactive approach to meet stakeholder demands. Henriques and Sadorsky (1999) support the idea that environmental proactivity is associated with higher pressures from organizational stakeholders (for instance suppliers, customers, shareholders, employees) and community stakeholders (for example NGO's, social groups), whereas environmental reactivity is associated with higher pressures from the media and regulatory stakeholders (for instance trade associations, governments). Buysse and Verbeke (2003) introduced the distinction between internal primary stakeholders (shareholders, employees, and financial institutions) and external primary stakeholders (customers and suppliers) and made an observation that only the former group motivates environmental proactivity. This was as a result of studying producers of intermediate products who had scarce consumer contact.

#### 2.2.2 Resource Based View

Resource-based view has been developed in work by Barney (1986), Teece (1988), and Teece & Pisano (1994), for analysing firm behaviour and competitive strategy (Mowery,

Oxley & Silverman, 1998). The RBV contends that the idiosyncratic resources and capabilities of firms are the key sources of sustained competitive advantage (Lynch, Keller & Ozment 2000). This premise appears to be supported by logistics and SCM research (such as Lynch et al., 2000). According to Barney (1991) resources can be classified into organizational capital resources, physical capital resources and human capital resources. Capabilities can be defined as the skills a firm needs to take full advantage of its assets.

Capabilities are complex bundles of individual skills, assets and accumulated knowledge exercised through organizational processes that enable firms to co-ordinate activities and make use of their resources (Olavarrieta & Ellinger, 1997). Tibben-Lembke (2002) describes the three generic strategies for competing in the marketplace as low-cost leadership, differentiation and focus. One avenue of creating a competitive advantage with differentiation is through building a brand reputation (Grant, 1991).

An organization may choose to focus on implementing reverse logistics practices to expose the negative environmental performance of its competitors. In this way, the organization can cut a niche for its products. Developing and implementing reverse logistics practices can only be achieved through creating environmentally responsible policies and investing in the necessary equipment and training. Creating a competitive advantage through implementing reverse logistics practices would lead to improved market share and consequently higher profit margins (Fortes, 2009).

#### 2.2.3 Institutional Theory

The institutional theory is concerned with the processes by which structures, routines, rules and norms become established as the guidelines for acceptable behaviour. Organizations act in a way that fulfils both customer and legal requirement. Pressures from these two parties influence the adoption of environmentally responsible behaviour (Laosirihongthong et al., 2013). Organizations have institutionalized reverse logistics practices because of internal and external pressures. As Carter, Smeltzer & Narasimhan, (2000) observed, companies institutionalize reverse logistics practices due to fear of loss of their market share to competitors and also awareness of the consequences of non-compliance with environmental imperatives (Carter et al., 2000). This is over and above growing demand of customers and environmental societies for more environmentally friendly products. These challenges and pressures push firms to seriously considering environmental impacts while doing their business.

Managerial decisions to adopt environmental management initiatives maybe influenced by three institutional mechanisms: normative, coercive and mimetic (Di Maggio & Powell, 1983). Due to normative pressures, such as customer requirements, organizations are forced to conform to be perceived as more legitimate (Zhu & Sarkis, 2004). Several external stakeholders can also impose coercive pressures on companies, depending on their power. Government bodies may for instance affect the adoption of environmental practices by firms by means of stringent environmental regulation (Delmas, 2002). Managers may also institute environmental practices as a strategy to mimic and outperform competition whose environmental responsibility has earned them a competitive edge (Zhu et al., 2007).

## **2.3 Reverse Logistics Practices**

Reverse logistics is the term commonly used to describe end of life product management. This means that reverse logistics is mainly concerned with return or take-back products and materials from the point of consumption to the forward supply chain for the purpose of recycling, reuse, remanufacture, repair, refurbishing or safe disposal (Carter & Ellram, 1998). Reverse logistics focuses on getting product back from customers rather than moving products to customers. Broadly defined, reverse logistics includes shipments of packaging waste, recyclable packages and customer returns in the logistics system. It is also important to note that reverse logistics emphasizes source reduction and substitution over reuse and recycling (Wu & Dunn, 1995). This refers to doing the same things with less resources hence eliminating waste.

There are three broad concepts on which reverse logistics is based and these are reuse, remanufacturing and recycling (Eltayeb et al., 2011). This research endeavoured to find out the extent to which these practices have been adopted by manufacturing firms in Kenya and their relationship with organizational performance.

#### **2.3.1 Reuse Reverse Logistics Practices**

Reuse is the process of collecting completely unused or slightly used products from the consumer and injecting them back into the supply chain without any upgrade or processing. The ultimate value of the product is therefore reduced (Eltayeb et al., 2011).

Practices under reuse include return of used products and packaging to suppliers for reuse, setting of quality standards for reuse, generating energy from renewable sources of energy and designing products for reuse (Rao & Holt, 2005). This study examines the extent to which the above reuse reverse logistics practices have been put into use by firms.

#### 2.3.2 Remanufacturing Reverse Logistics Practices

In remanufacture, a product is collected from the field, assessed and there after either repaired, refurbished or overhauled. This entails replacing the defective parts of the product with refurbished or new parts. Remanufacture takes place when there is no possibility of direct reuse of the product or such a reuse is no longer economical. If managed properly, remanufacture can generate lucrative business opportunities through recapturing otherwise lost value (Toffel, 2004).

Practices under remanufacture include setting up of repair workshops, training employees on repair and refurbishing and setting up warehouses for storage of parts. Another common practice in remanufacturing is the issuance of a warranty. This is especially common with electronic products' manufacturers for instance LG and Samsung who issue warranties of up to one year on their products (Azevedo et al., 2011).

#### 2.3.3 Recycling Reverse Logistics Practices

Recycling is the process of recovering any piece of a returned product that may contain value. In recycling, collected used products are disassembled and useful material extracted from them. The identity and functionality of the original material is lost (Eltayeb et al., 2011).

Practices under recycling include return of used products and packaging to suppliers for recycling, executing well-structured market incentives and having a well-documented recycling policy. Another practice under recycling includes the sensitization or creation of awareness to the buyer. Organizations may create awareness by putting the recycling labels of three arrows intertwining clockwise as a sign that the product or package should be recycled (Laosirihongthong et al., 2013).

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.

## 2.4 Empirical Review

Internationally, a number of studies have been done to try and establish the relationship between reverse logistics practices adoption and organizational performance. Green et al. (2011) found out that successful implementation of GSCM practices such as green purchasing, cooperation with customers, Eco design and reverse logistics will lead to improved environmental and economic performance which support improved organizational performance. Further, their findings show that cost saving nature of reverse logistics should lead to improved economic performance and both environmental performance and economic performance should yield improved operational efficiency. These generate cost savings and reflect on an organization's ability to satisfy changing customer demands for environmentally sustainable products and services.

According to Rao and Holt (2005), green supply chains do give firms competitive advantage and also lead to increased economic performance. They observed that the image of products of firms that practiced reverse logistics in Philippines had been positively affected giving such firms a competitive advantage. Their study mainly focused on the financial outcomes of organizational performance. This is where this study comes in to fill the gap as it will focus on both the financial as well as marketing outcomes of organizational performance.

Eltayeb et al. (2011) investigated the outcomes of green supply chain initiatives among certified companies in Malaysia and environmental sustainability. Among the four possible outcomes they investigated, which included environmental outcomes, economic outcomes, cost reductions and intangible outcomes, reverse logistics was found to have a significant positive effect on cost reductions only. This study tests the hypothesis that reverse logistics practices have a positive effect on both the financial and marketing performance of organizational performance.

According to De Giovanni and Esposito Vinzi (2012) in their study of covariance versus component-based estimations of performance in green supply chain management, they found that no significant relationship exists between green supply chain management practices and organizational performance especially economic performance.

Azevedo et al., (2011) explored the influence of green practices on supply chain performance with a focus on the automotive industry in Portugal. This study provides evidence that green practices have a positive effect on quality, customer satisfaction and efficiency. However, it also identifies that green practices are costly to implement and therefore have a negative effect on the financial performance of firms.

There have also been a few studies that have focused on reverse logistics in Kenya. Waithaka (2012) studied the reverse logistics practices in medical supplies by looking at the case study of Kenya Medical Supply Agency. Although his study showed that the adoption of reverse logistics practices at the Kenya Medical Supply Agencies was low, there was a positive relationship between reverse logistics and operational performance of the agency.

Ongombe (2012) looked at the relationship between reverse logistics and competitive advantage in water bottling companies in Nairobi. This study concluded that there was indeed a strong relationship between reverse logistics and competitive advantage. Companies that implemented reverse logistics practices benefitted from increased profit margins due to reduction in production costs and increased sales.

Langat (2012) examined reverse supply chain management practices in large scale manufacturing firms in Nairobi. His study observed a significant influence of implementation of reverse supply chain practices to the organizations' financial performance. Another study focusing on reverse logistics done in Kenya was by Gitau (2010) who studied the effects of reverse logistics on the performance of East African Breweries. This study found a positive relationship between the two. Most of these studies however focus on certain segments of the manufacturing industry.

The research which comes closest to this study was done by Serut (2013) whose main concern was on the financial aspect of organizational performance. Although his study found a positive relationship between reverse logistics and organizational performance, this study argues that reverse logistics is a broad concept and therefore should be broken down into sub components of reuse, remanufacture and recycle reverse logistics practices. The kind of data he collected was mainly concerned on the financial aspect of an organization's performance, while this study focuses on organizational performance as a whole which include marketing performance as well as financial performance. Serut also chose regression analysis as his method of analysis although his organizational performance variable is defined on an ordinal scale. This study proposes to employ ordered probit method as advocated by Greene and Hensher (2003) in cases where the dependent variable is ordinal.

## 2.5 Summary

This is a review of literature on works linking reverse logistics practices with organizational performance. Over the past decade, most studies on reverse logistics have been carried out mainly in Asia for example Rao and Holt (2005) and Eltayeb et al. (2011) and the developed countries for instance Green, Zelbst, Meacham and Bhadauria (2011) in the USA. However, there has been little research carried out on this topic in developing countries such as Kenya with huge manufacturing potentials.

From the review of literature done on studies on reverse logistics carried out in Kenya, most studies including Waithaka (2012), Ongombe (2012), Langat (2012) and Gitau (2010) were only focused on certain segments of the manufacturing industry. Serut (2013) did a research close to this one but he mainly focused on the financial aspect of organizational performance.

## 2.6 Conceptual Model



The study intended to establish the relationship between reverse logistics practices and organisational performance of manufacturing firms in Kenya. It was hypothesised that organisational performance of manufacturing firms in Kenya is influenced by adoption of reverse logistics practices such as reuse, remanufacture and recycling. Control variables including the size of the firm, age and availability of environmental department were used.

#### **CHAPTER THREE: RESEARCH METHODOLOGY**

#### **3.1 Introduction**

This chapter describes the methodology that was used in conducting the study. It includes the research design, population of the study, sample and sampling technique, data collection, operationalization of research variables and data analysis techniques.

### **3.2 Research Design**

A descriptive Cross-sectional survey design was employed in this study. Descriptive survey as described by Kothari, Sabino & Zach (2005) is a scientific method which involves observing and describing the behaviour of a subject without influencing it in any way. Mugenda and Mugenda (1999) define survey as a strategy used to collect information from a large population by use of structured interviews, questionnaires among other methods. This research design is suitable for this study because it is an efficient way of collecting information from a selected number of respondents being targeted from a given population. Cross-sectional studies involve data collection from a population, or a selected subset, at one specific point in time (Cooper & Schindler, 2006). Cross-sectional surveys have been used in previous studies dealing with reverse logistics including Serut (2013).

#### **3.3 Population of the Study**

The population of this study consisted of all manufacturing firms in Kenya. The target population was all manufacturing firms in Kenya which are members of Kenya
Association of Manufacturers (KAM). According to the Kenya manufacturers and exporters 2014 directory KAM has 766 members.

## 3.4 Sample and Sampling Technique

This study employed proportionate stratified random sampling technique. This technique was preferred because manufacturing firms in Kenya fall under 14 sectors according to KAM. This research employed this technique because the elements sampled from each sector were proportional to their representation in the total population. A sample size of seventy five firms was selected for this study which represented about 10% of the total population. This is because previous researchers on reverse logistics have used this sample size in their research Serut (2013).

Subsector	Total population	Sample
Service & consultancy	77	8
Building, Mining & Construction	22	2
Chemical & allied sector	74	7
Energy, Electrical & Electronics	40	4
Food & Beverages	181	18
Leather & Footwear	10	1
Metal & Allied Sector	75	8
Motor Vehicle & Accessories	40	4
Paper & Board Sector	69	7
Pharmaceutical & Medical Equipment	23	2
Plastics & Rubber	69	7
Fresh Produce	4	1
Textile & Apparels	63	6
Timber, Wood & Furniture	19	2
Total	766	77

Table 3.1: Key Manufacturing Sectors and number of firms to be sampled

#### **3.5 Data Collection**

Data for this study was obtained from primary sources. The primary data was collected through the use of a structured questionnaire. The questionnaire was designed based on study objectives and was administered using 'drop-and-pick-later' method.

The questionnaire comprises of closed and open ended questions. It is sub divided into three sections; the first part sought general information on the firm. The second part focused on the reverse logistics practices adopted by the firms. The third part contained the questions aimed at determining the effect of reverse logistics on organizational performance of the manufacturing firms. The target respondents were the senior managers in their respective organizations charged with developing and implementing policy.

## **3.6 Operationalization of Research Variables**

In this study the dependent variable was organizational performance. The study sought to find out the relationship of reverse logistics practices and organizational performance and therefore reverse logistics practices were the independent variables. Reverse logistics practices were broken down into three concepts of reuse, remanufacture and recycle reverse logistics practices. Table 3.2 shows how each of these three practices were operationalised and table 3.3 shows the operationalization of financial as well as market performance variables.

Table 3.2:	Independent	Variables
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Reverse logistics practice	Indicators
Reuse	Set quality standards for reuse
	Generate energy from renewable sources of energy
	Design products for reuse
	Return used products and packaging to suppliers for
	reuse
Remanufacture	Setting up of repair workshops
	Train employees on repair and refurbishing
	Set up warehouses for storage of parts
	Has a warranty for its products
Recycling	Return used products and packaging to suppliers for
	recycling
	Create awareness
	Well documented recycling policy
	Structured market incentives

## Table 3.3: Dependent Variables

Performance measure	Indicators
Financial performance	1. Gross Profit Margin
	2. Return on Investment
	3. Return on sales
	4. Ability to Fund Business Growth from Profits
Market performance	1. Market share growth
	2. Sales volume growth (in units)
	3. Sales growth (in shillings)

**Table 3.4: Control Variables** 

Control Variable	Indicators
Firm Size	Number of employees
Age of Firm	Years the firm has been in operation
Environmental Department	Whether the firm has an environmental
	department or not

#### **3.7 Data Analysis**

The questionnaires were first checked for accuracy, consistency and completeness. Thereafter, the data was edited, coded, classified and tabulated for ease of interpretation and further analysis. Data to achieve the first objective was analysed using descriptive measures of mean and standard deviation. Data to achieve the second objective was analysed using the ordered probit model. In statistics, ordered probit is a generalization of the popular probit analysis to the case of more than two outcomes of an ordinal dependent variable.

The dependent variable would be the financial and marketing performance of the organization. Using the ordered probit model, the following explanatory variables are included: reuse RL practices, remanufacture RL practices, and recycle RL practices and a set of firm specific variables that are expected to affect organizational performance. These include; size of the firm in terms of number of employees, age of the firm in years, whether a firm has an environmental department (dummy variable). The relationship is modelled as follows.

 $Y_i^* = \beta_0 + \beta_1 R U_i + \beta_2 R M_i + \beta_3 R C_i + \beta_4 S Z_i + \beta_5 A G_i + \beta_6 E D P T_i + \varepsilon_1$ 

Where,

 $Y_i^*$  = unobserved organizational performance variable

 $Y_i$  = Organizational performance variable

 $Y_i = 0$  if  $Y^* \le 0$ , indicating very poor organizational performance.

 $Y_i = 1$  if  $0 < Y^* \le \mu_1$ , indicating poor organizational performance

 $Y_i = 2$  if  $\mu_1 < Y^* \le \mu_2$ , indicating average organizational performance

 $Y_i = 3$  if  $\mu_2 < Y^* \le \mu_3$ , indicating good organizational performance

 $Y_i = 4$  if  $\mu_3 < Y^*$ , indicating very good organizational performance

 $\mu_1$ ,  $\mu_2$ , and  $\mu_3$  are jointly estimated threshold values which determine the organizational performance

 $RU_i$  = extent to which reuse reverse logistics practices are adopted by the firm.

 $RM_i$  = extent to which remanufacture reverse logistics practices are adopted by the firm.

 $RC_i$  = extent to which recycling reverse logistics practices are adopted by the firm.

 $SZ_i$  = number of employees in the firm.

 $AG_i$  = number of years the firm has been in operation.

 $EDPT_i$  is a dummy variable. It equals 0 for firms that do not have an environmental department and 1 for firms that have an environmental department.

 $\varepsilon_i$  = error term which are normally distributed with a mean of zero and standard deviation of one.

The individual parameters were tested for significance using t-test at 5% level of significance. Scaled R-squared, a nonlinear transformation of the constrained and

unconstrained maximum likelihood values was used as a measure of fit. It is bounded within zero and one like ordinary R-squared in classical regression analysis (Estrella, 1998). The probability value for the likelihood ratio was employed to determine if the explanatory variables used in the probit model are appropriate.

## CHAPTER FOUR: RESULTS, DATA ANALYSIS AND DISCUSSION

## **4.1 Introduction**

This chapter presents an analysis of data collected and discusses the findings on the relationship between reverse logistics practices and organisational performance of manufacturing firms in Kenya.

## 4.2 Demographic Characteristics of the Respondents

The study targeted 77 manufacturing firms. A total of 75 useful questionnaires were obtained. This represents a response rate of 97.4%. The firms' subsectors were as shown in Table 4.1.

Subsector	Frequency	Percentage
Service & consultancy	8	10.7
Building, Mining & Construction	2	2.7
Chemical & allied sector	7	7.3
Energy, Electrical & Electronics	4	5.3
Food & Beverages	17	22.7
Leather & Footwear	1	1.3
Metal & Allied Sector	8	10.7
Motor Vehicle & Accessories	4	5.3
Paper & Board Sector	7	9.3
Pharmaceutical & Medical Equipment	2	2.7
Plastics & Rubber	7	9.3
Fresh Produce	1	1.3
Textile & Apparels	5	6.7
Timber, Wood & Furniture	2	2.7
Total	75	100.0

#### Table 4.1: Firms' Subsector

Information contained in Table 4.1 shows that 17 (22.7%) firms sampled were from food and beverages subsector which constituted the majority of the study sample due to the high number of firms in this subsector. A list of all the firms surveyed is attached as appendix III. A summary of the other findings were as presented in Table 4.2.

**Table 4.2: Respondents' Demographic Characteristics** 

Characteristic	Frequency	Percentage
Ownership: Fully locally Owned	28	37.3
Fully foreign Owned	12	16.0
Partly locally and foreign Owned	35	46.7
Total	75	100.0
Length of operation of the firms in yrs: Less than 20	15	20.0
20 - 35	26	34.7
36 - 50	29	38.7
Above 50	5	6.7
Total	75	100.0
Number of staff in the company: Less than 100	24	32.0
100 - 500	43	57.3
501 - 1000	8	8.0
Above 1000	2	2.7
Total	75	100.0
Does your firm have an environmental: Yes	38	50.7
Management department No	37	49.3
Total	75	100.0

#### 4.2.1 Ownership

Data collected show that 28 (37.3%) manufacturing firms sampled were fully locally owned, 12 (16.0%) were fully foreign owned while the remaining 35 (46.7%) were partly local partly foreign owned. This means that a majority of the firms had local ownership thus indigenous to the country.

#### 4.2.2 Length of Operation of the Firm

Relative to the firms' length of operation, data obtained show that 15 (20.0%) firms had been in operation for a period of less than 20 years, 26 (34.7%) firms had operated for periods ranging between 20 and 35 years, 29 (38.7%) for 36 and 50 years and the remaining 5 (6.7%) for a period above 50 years. This means that a majority of the

manufacturing firms could be considered to have been in operation for periods long enough to have enabled them to attempt adoption of reverse logistics practices.

#### 4.2.3 Number of Employees

With regard to the human resource base of the companies, 24 (32.0%) manufacturing firms indicated having less than 100 employees, 43 (57.3%) had between 100 and 500, 8 (8.0%) had between 501 and 1000 while the remaining 2 (2.7%) had over 1000 employees. This means that almost all the firms had adequate human resource base that could enable them attempt reverse logistics practice adoption.

#### 4.2.4 Presence of Environmental Management Department

An inquiry on which firms had an environmental management department showed that 38 (50.7%) firms had the department while 37 (49.3%) did not. This means that a slight majority of the firms had the requisite department for monitoring the process of implementation of reverse logistics practices.

## 4.3 Extent of Adoption of Reverse Logistics

The study sought to establish the extent of adoption of reverse logistics practices within manufacturing firms within the Country. Respondents were requested to state the extent of adoption of indicators of elements of reverse logistics practices including reuse, remanufacture and recycling. A 5-point Likert scale was used to rate the extent of adoption of the elements of these indicators whereby 1 was accorded to 'no extent', 2 to 'small extent', 3 to 'moderate extent', 4 to 'great extent' and 5 to 'very great extent'.

#### **4.3.1 Reuse Reverse Logistics Practices**

The study began by assessing the level of adoption of reuse reverse logistics practices. The findings were as is indicated in table 4.3.

L 8			
Statement	Mean	SD	Rank
Return used products and packaging to suppliers for reuse.	4.0267	1.0902	1
Set quality standards for reuse	3.7333	1.1547	2
Generate energy from renewable sources of energy	3.4000	1.5769	4
Design product for reuse	3.5200	1.4829	3
Grand Mean	3.6700	1.3262	

Table 4.3: Extent of Adoption of Reuse Reverse Logistics Practice

Results presented in table 4.3 show that the extent of adoption of elements of reuse as a reverse logistics practice by manufacturing firms are clear and measurable as indicated is by its weighted mean of 3.6700. Respondents were found to be very familiar with return of used products and packaging to suppliers for reuse given its mean of 4.0267. Likewise, they indicated that adoption of set quality standards for reuse was relatively prominent given its mean of 3.7333 as well as that of design for products for reuse (mean of 3.5200) and that of generation of energy for renewable sources of energy given its mean of 3.4000.

#### 4.3.2 Remanufacture Reverse Logistics Practices

Remanufacture was also assessed to determine its adoption within the manufacturing firms. Respondents were probed with statement seeking to determine whether the various elements of remanufacture were applied within their firms. The results were as is recorded in table 4.4.

Statement	Mean	SD	Rank
Has set up repair workshops	3.2000	1.5157	4
Train employees on repair and refurbishing	4.0133	0.9655	3
Has set up warehouses for storage of parts	4.0667	1.0822	1
Has a warranty for its products	4.0400	0.9924	2
Grand Mean	3.8300	1.1390	

 Table 4.4: Extent of Adoption of Remanufacture Reverse Logistic Practice

From table 4.4 which contains the results of extent of adoption of elements of remanufacture as a reverse logistics practice shows that remanufacture is a prominent reverse logistics practice given its weighted mean of 3.8300. The respondents acknowledged having set up warehouses for storage of parts thus its mean of 4.0667 as well as having a warranty for their product as is explained by its mean of 4.0400. Similarly, respondents confirmed that their firms train employees on repair and refurbishing given its mean of 4.0133and that they had set up repair workshops given its mean of 3.2000.

## 4.3.3 Recycling Reverse Logistics Practices

Further, the study sought to establish the extent of adoption of elements of recycling reverse logistics practices. Using Likert scale to rank indicators of recycling, the results were as is presented in Table 4.5.

Tuble 4.2. Extent of Mulphon of MeeyeningKeverse Logistics	inactice	9	
Statement	Mean	SD	Rank
Return used products and packaging to suppliers for recycling.	3.8000	1.1150	4
Create awareness to the public about recyclable products	4.1467	1.0867	2
Well documented recycling policy	3.9867	1.3997	3
Structured market incentives	4.6800	0.5492	1
Grand Mean	4.1534	1.0377	

Table 4.5: Extent of Adoption of RecyclingReverse Logistics Practices

Table 4.5 contains the results of the extent of adoption of recycling as an indicator of reverse logistics practice. The results show that the extent of adoption of recycling is clearly defined as adduced to by its overall mean ranking of 4.1534. Respondents seemed to be more familiar with structured market incentives thus a high mean ranking of 4.6800 followed by creation of public awareness on recyclable products (4.1467) then clear documentation of recycling policy (3.9867) and lastly return of used products and packaging to suppliers for recycling (3.8000) as elements of recycling.

#### 4.3.4 Extent of Adoption of Reverse Logistics Practices

Lastly, an attempt was made to determine the extent of adoption of reverse logistics practices. Table 4.6 presents an analysis of the ranking of the elements of adoption of reverse logistics practices as perceived by the respondents.

6 I	L L	,	
<b>Reverse Logistics Practices</b>	Mean	Std. Dev.	Rank
Reuse	3.6700	1.3262	3
Remanufacture	3.8300	1.1390	2
Recycling	4.1534	1.0377	1
Grand Mean	3.8845	1.1676	

Table 4.6: Ranking of Indicators of Adoption of Reverse Logistics Practices

The results show that recycling (4.1534) registered the highest ranking as an element of adoption of reverse logistics practice by firms in the manufacturing sector. This was followed by remanufacture (3.8300) and lastly reuse (3.6700) in decreasing order of adoption. The finding corroborates the assertions of Gitau (2010); Langat (2012); Ongombe (2012) and Serut (2013) on adoption of reverse logistic practices in manufacturing firms in Kenya at variable extents.

#### 4.4 Relationship between Reverse Logistics Practices Adoption and

## **Organisational Performance**

To facilitate an inferential analysis of the relationship between the elements of adoption of reverse logistics practices and organisational performance of manufacturing firms, the respondents were requested to score for indicators of financial and marketing performance. Data on extent of adoption of reuse, remanufacture and recycling reverse logistics practices were computed and converted into categorical data to be used as independent variables. Similarly, the respondents' score on indicators of financial, market and overall performance were computed and converted into categorical data. Age of the manufacturing firms and its size in terms of population of workers were included as control variables.

Then, an ordered probit model was applied to determine the relationship between reverse logistics practices and organisational performance of manufacturing firms in Kenya. A probit model applied was:

$$\mathbf{Y}^* = \mathbf{X'}\boldsymbol{\beta} + \boldsymbol{\varepsilon},$$

Where  $y^*$  is the exact but unobserved dependent variable

**X** is the vector of independent variables, and  $\beta$  is the vector of regression coefficients which we wish to estimate.

Moreover, instead of the unobserved variable Y\*, we use the observable categories of response:

 $Y_i = 0$  if  $Y^* \le 0$ , indicating very poor organizational performance.

 $Y_i = 1$  if  $0 < Y^* \le \mu_1$ , indicating poor organizational performance

 $Y_i = 2$  if  $\mu_1 < Y^* \le \mu_2$ , indicating average organizational performance

 $Y_i = 3$  if  $\mu_2 < Y^* \le \mu_3$ , indicating good organizational performance

 $Y_i = 4$  if  $\mu_3 < Y^*$ , indicating very good organizational performance

 $\mu_1$ ,  $\mu_2$ , and  $\mu_3$  are jointly estimated threshold values which determine the organizational performance

In order to show the result of the relationship between reverse logistics and organisational performance, basic regression can be extended to the function as follows:

$$Y_i^* = \beta_0 + \beta_1 R U_i + \beta_2 R M_i + \beta_3 R C_i + \beta_4 S Z_i + \beta_5 A G_i + \beta_6 E D P T_i + \varepsilon_1$$

Where,

 $Y_i^*$  = unobserved organizational performance variable

 $RU_i$  = extent to which reuse reverse logistics practices are adopted by the firm.

RM<sub>i</sub> = extent to which remanufacture reverse logistics practices are adopted.

 $RC_i$  = extent to which recycling reverse logistics practices are adopted.

 $SZ_i$  = number of employees in the firm.

 $AG_i$  = number of years the firm has been in operation.

EDPT<sub>i</sub> is a dummy variable.

 $\beta_0$  is regression constant;  $\beta_1 - \beta_6$  are regression coefficients;

 $\varepsilon_i$  = error term which are normally distributed with a mean of zero and standard deviation of one.

Considering that performance was measured in terms of financial, market and overall computed performance attributes, each of these components were designated  $Y_1,\ Y_2$  and Y respectively and regressed against the independent and control

variables yielding the results discussed in the succeeding sections.

#### 4.4.1 Reverse Logistics and Financial Performance

A probit regression analysis of the relationship between indicators of reverse logistics and

financial performance done yielded the results as is shown in Table 4.7.

	Estimate	Std.	Wald	df	Sig.	Model Fitting Information			
		Error				-2 Log	Chi-	df	Sig.
						Likelihood	Square		
[Financial = 1.00]	-2.548	.670	14.481	1	.000				
[Financial = 2.00]	-1.937	.643	9.076	1	.003				
[Financial = 3.00]	956	.622	2.364	1	.124				
[Financial = 4.00]	095	.616	.024	1	.878				
[Financial = 5.00]	1.714	.703	5.942	1	.015				
AGi	010	.157	.004	1	.950	218.202			
SZi	009	.006	2.516	1	.113	196.599	21.603	10	.017
EDPT	054	.279	.037	1	.847				
[Reuse=2.00]	.441	.695	.403	1	.525				
[Reuse=3.00]	-1.084	.359	9.119	1	.003				
[Reuse=4.00]	124	.337	.136	1	.712				
[Reuse=5.00]	0 <sup>a</sup>			0					
[Remanufacture=3.00]	206	.401	.264	1	.607				
[Remanufacture=4.00]	.087	.360	.058	1	.809				
[Remanufacture=5.00]	0 <sup>a</sup>			0	•				
[Recycling=3.00]	732	.471	2.408	1	.121				
[Recycling=4.00]	407	.300	1.833	1	.176				
[Recycling=5.00]	0 <sup>a</sup>		•	0	•				

Table 4.7: Probit Regression Analysis Results for Financial Performance

Link function: Probit.

a. This parameter is set to zero because it is redundant.

The following relationships were established by the probit analysis:

 $Y = -2.548 - 0.010X_4 - 0.009X_5 - 0.054X_6 - P = 0.017$   $Y = -1.937 + 0.441X_1 - 0.010X_4 - 0.009X_5 - 0.054X_6 - P = 0.017$ 

 $Y = -0.956 - 1.084X_1 - 0.206X_2 - 0.732X_3 - 0.010X_4 - 0.009X_5 - 0.054X_6 - \dots P = 0.017$ 

#### $Y = -0.095 - 0.124X_1 + 0.087X_2 - 0.407X_3 - 0.010X_4 - 0.009X_5 - 0.054X_6 - \dots P = 0.017$

The probit model was tested and found to have a favourable Chi – Square values [F=21.603; df=10; P=0.017] indicating that at 0.05 level of significance, the model is fit for this analysis.

The first equation implies that when independent variables (reuse, remanufacture and recycling reverse logistics)are controlled for, there is a probability that financial performance would be negative by a factor of 2.548, this observation being significant (p=.000). The analysis also shows that control variables such as age of the firm, size of the manufacturing firm (number of its employees) and whether or not a firm has an environmental department have a probability of negatively affecting financial performance, each of these observations being insignificant at 0.05 levels of significance (p=.950; p=.113 and p=.847 respectively). The observation implies that according to the respondents, the age of a manufacturing firm, its number of employees and whether or not it has an environmental department affects its financial performance negatively. This means that initially as the manufacturing firms attempt to put in place infrastructure it spends more thus affecting its financial performance negatively.

The second equation indicates that introduction of reuse reverse logistics practices leads to an increase in regression constant and a probability of positively affecting financial performance; the observation being insignificant at 0.05 according to the p value (p=.525). Equation three and four with all the factors additionally show that inclusion of remanufacture and recycling reverse logistics practices leads to a further increase in value

of the regression constant. However, remanufacture and recycling reverse logistics were found to have a negative regression coefficients implying a probable negative influence on financial performance with the observation being insignificant at 0.05 according to the p values (p=.607 and p=.121 respectively).

The probability relationships implied in the probit regression equation could be interpreted to mean that according to the respondents, there are other factors not accounted for in the study which could be impacting negatively on the financial performance of the manufacturing firms thus the negative regression constant. Adoption of reuse reverse logistics positively impacts on financial performance, adoption of remanufacture and recycling reverse logistics have an initial negative impact on financial performance. Further, the model implied that an adoption of reuse, remanufacture and recycling reverse logistics have an accumulated probability of positively impacting on the unaccounted for factors thus registering a net positive impact on the manufacturing firms' financial performance. However, none of these processes is significant. Lastly, the model implies that an improvement in financial performance of manufacturing firms would most probably result from increased adoption of remanufacture and recycling reverse logistics.

#### 4.4.2 Reverse Logistics and Market Performance

Similarly, a probit regression analysis of the relationship between indicators of reverse logistics and market performance done yielded the results shown in Table 4.8.

	Estimate	Std.	Wald	df	Sig.	Model Fitting Information			
		Error				-2 Log.	Chi-	df	Sig.
						Likelihood	Square		
[Market = 1.00]	-3.445	.792	18.898	1	.000		-		
[Market = 2.00]	-1.956	.665	8.657	1	.003				
[Market = 3.00]	-1.403	.653	4.619	1	.032				
[Market = 4.00]	033	.639	.003	1	.959				
AGi	049	.163	.089	1	.765				
SZi	020	.007	9.247	1	.002	190.240			
EDPT	.222	.289	.588	1	.443	163.423	26.816	10	.003
[Reuse=2.00]	.024	.711	.001	1	.973				
[Reuse=3.00]	-1.093	.373	8.614	1	.003				
[Reuse=4.00]	395	.354	1.245	1	.264				
[Reuse=5.00]	0 <sup>a</sup>			0	•				
[Remanufacture=3.00]	.039	.413	.009	1	.926				
[Remanufacture=4.00]	.226	.374	.365	1	.546				
[Remanufacture=5.00]	0 <sup>a</sup>	•		0	•				
[Recycling=3.00]	-1.016	.491	4.288	1	.038				
[Recycling=4.00]	606	.313	3.742	1	.053				
[Recycling=5.00]	$0^{a}$	•		0					

 Table 4.8: Probit Regression Analysis Results for Market Performance

Link function: Probit.

a. This parameter is set to zero because it is redundant.

Results from the model fitting information section of Table 4.8 show that a test on the suitability of the probit model yielded a Chi – Square test results [F=26.816; df=10; P=0.003] indicating that at 0.05 level of significance, the model was fit for this analysis. The following relationships were established by the probit analysis:

 $Y = -3.445 - 0.049X_4 - 0.020X_5 + 0.222X_6 - P = 0.003$   $Y = -1.956 + 0.024X_{1-} - 0.049X_4 - 0.020X_5 + 0.222X_6 - P = 0.003$   $Y = -1.403 - 1.093X_{1+} + 0.039X_2 - 1.016X_3 - 0.049X_4 - 0.020X_5 + 0.222X_6 - P = 0.003$   $Y = -0.033 - 0.395X_1 + 0.226X_2 - 0.606X_3 - 0.049X_4 - 0.020X_5 + 0.222X_6 - P = 0.003$ The first equation implies that when independent variables (reuse, remanufacture and recycling reverse logistics) are controlled for, there is a probability that market

performance would be negative by a factor of 3.445, this observation being significant (p=.000). The analysis also shows that control variables such as age of the firm and size of the manufacturing firm (number of its employees) have a probability of negatively affecting market performance, the effect of size being significant at 0.05 level of significance (p=.002). However, whether or not a firm has an environmental department was shown to have a probability of positively affecting market performance by a factor of 0.222, this observation being insignificant at 0.05 level of significance (p=.443). The observation implies that according to the respondents, the age of a manufacturing firm and its number of employees has a probability of affecting market performance negatively though whether or not it has an environmental department affects it positively.

The second equation indicates that introduction of reuse reverse logistics practices not only leads to an increase in regression constant but also a probability of positively affecting market performance; the observation being insignificant at 0.05 p values. Equation three and four with all the factors additionally show that inclusion of remanufacture and recycling reverse logistics practices in the model leads to a further increase in the value of the regression constant. Additionally, it shows that while adoption of remanufacture reverse logistics practices has a probability of positively affecting market performance, adoption of recycling reverse logistics was found to have a negative regression coefficients implying a probable negative influence on market performance with the observation on recycling being significant at 0.05 p values (p=.038).

The probability relationships implied in the probit regression equation could be interpreted to mean that according to the respondents, adoption of reuse and remanufacture reverse logistics positively impacts on market performance, though adoption of recycling reverse logistics have an initial negative impact. Further, the model implied that an adoption of reuse, remanufacture and recycling reverse logistics have an accumulated probability of positively impacting on the unaccounted for factors thus registering a net positive impact on the manufacturing firms' market performance. Lastly, the model implies that an improvement in market performance of manufacturing firms would most probably result from increased adoption of remanufacture and recycling reverse logistics.

#### 4.4.3 Reverse Logistics and Organisational Performance

Lastly, a probit regression analysis of the relationship between indicators of reverse logistics and organisational performance yielded the results as is shown in Table 4.9.Results from the model fitting information section of the table shows that a test on the suitability of the probit model yielded Chi – Square test results [F=25.160; df=10; P=0.005] indicating that at 0.05 level of significance, the model was fit for this analysis

	Estimate	Std.	Wald	df	Sig.	Model Fitting Information			
		Error				-2 Log.	Chi-	df	Sig.
						Likelihood	Square		
[Performance = 1.00]	-2.641	.699	14.298	1	.000				
[Performance = 2.00]	-1.724	.651	7.007	1	.008				
[Performance = 3.00]	749	.634	1.395	1	.238				
[Performance = 4.00]	.702	.633	1.230	1	.267				
AGi	.091	.161	.321	1	.571				
SZi	014	.006	5.867	1	.015				
EDPT	.052	.285	.034	1	.855	199.595			
[Reuse=2.00]	218	.701	.097	1	.756	174.435	25.160	10	.005
[Reuse=3.00]	-1.330	.376	12.510	1	.000				
[Reuse=4.00]	567	.351	2.600	1	.107				
[Reuse=5.00]	$0^{a}$			0					
[Remanufacture=3.00]	.143	.406	.124	1	.724				
[Remanufacture=4.00]	.523	.369	2.004	1	.157				
[Remanufacture=5.00]	$0^{\mathrm{a}}$			0	•				
[Recycling=3.00]	577	.476	1.469	1	.225				
[Recycling=4.00]	538	.308	3.046	1	.081				
[Recycling=5.00]	$0^{\mathrm{a}}$			0					

Table 4.9: Probit Regression Analysis Results for organisational Performance

Link function: Probit.

a. This parameter is set to zero because it is redundant.

The model used yielded the following equations:

 $Y = -2.641 + 0.091X_4 - 0.014X_5 + 0.052X_6 - P = 0.005$   $Y = -1.724 - 0.218X_1 + 0.091X_4 - 0.014X_5 + 0.052X_6 - P = 0.005$   $Y = -0.749 - 1.330X_1 + 0.143X_2 - 0.577X_3 + 0.091X_4 - 0.014X_5 + 0.052X_6 - P = 0.005$   $Y = 0.702 - 0.567X_1 + 0.523X_2 - 0.538X_3 + 0.091X_4 - 0.014X_5 + 0.052X_6 - P = 0.005$ The first equation implies that when independent variables (reuse, remanufacture and recycling reverse logistics) are controlled for, there is a probability that organisational performance would be negative by a factor of 2.641, this observation being significant (p=.000). The analysis also shows that control variables such as age of the firm and whether or not a firm has an environmental department have a probability of positively

affecting organisational performance, the effect of size being insignificant at 0.05 levels of significance (p=.571 and p=.855 respectively). However, the size of a manufacturing firm was shown to have a probability of negatively affecting organisational performance by a factor of 0.014, this observation being significant at 0.05 levels of significance (p=.015). The observation implies that according to the respondents, the age of a manufacturing firm and whether or not it has an environmental department has a probability of affecting organisational performance positively though its number of employees affects it negatively.

The second equation indicates that though introduction of reuse reverse logistics practices leads to an increase in regression constant it has a probability of negatively affecting organisational performance; the observation being insignificant at 0.05 p values. Equation three and four with all the factors additionally show that inclusion of remanufacture and recycling reverse logistics practices in the model leads to a further increase in value of the regression constant. Additionally, it shows that while adoption of remanufacture reverse logistics practices has a probability of positively affecting market performance, adoption of recycling reverse logistics practices was found to have a negative regression coefficients implying a probable negative influence on organisational performance with these observation being insignificant at 0.05 p values (p=.724; p=.225 respectively).

The probability relationships implied in the probit regression equation could be interpreted to mean that according to the respondents, adoption of reuse and recycling reverse logistics practices negatively impacts on organisational performance, though adoption of remanufacture reverse logistics practices has a positive impact. Further, the model implied that an adoption of reuse, remanufacture and recycling reverse logistics practices has an accumulated probability of positively impacting on the unaccounted for factors thus registering a net positive impact on the manufacturing firms' organisational performance. Lastly, the model implies that an improvement in organisational performance of the manufacturing firms would most probably result from increased adoption of remanufacture reverse logistics practices.

# CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS

#### **5.1 Introduction**

In this chapter, an attempt is made to give a summary of the research findings, conclusions, recommendation and suggestion for further research. The main purpose of this study was to establish if there exists a relationship between reverse logistics practices adoption and the organizational performance of manufacturing firms in Kenya. Data for analysis was obtained by use of questionnaires designed by the researcher for logistics managers within the manufacturing firms. Information obtained was analyzed quantitatively with the aid of statistical package for social sciences (SPSS) version 20 computer software.

## 5.2 Summary

From data analysis in chapter four, the study isolated some issues on the relationship between reverse logistics adoption and organisational performance of manufacturing firms within Kenya. The contents of the analysis can be summarized as follows:

#### 5.2.1 Respondents' bio data

Out of the 77 questionnaires, 75 were obtained back representing a response rate of 97.4%. The study established that a majority of the firms had local ownership thus indigenous to the country; most of the firms had been in operation for periods long enough some extending to beyond 50 years. Similarly, almost all the firms were found to have adequate human resource base that could enable them attempt various practices

including reverse logistics though only a slight majority of the firms had an environment department required for monitoring the process of implementation of reverse logistics practices.

#### 5.2.2 Extent of Adoption of Reverse Logistics Practices

An inquiry on the extent of adoption of reverse logistics was based on level of adoption of elements of reuse, remanufacture and recycling reverse logistics practices. The findings showed there is a significant level of adoption of each of the indicators (reuse, remanufacture and recycling) with each of the indicators attaining above average levels of mean ranking (above 3.5000 out of 5) thus giving overall level of reverse logistics adoption by manufacturing firms a mean of 3.8845 out of 5. It was also established that recycling as an indicator of adoption of reverse logistics practice by firms in the manufacturing sector had the highest mean ranking followed by remanufacture and lastly reuse in decreasing order of adoption.

#### 5.2.3 Relationship between Reverse Logistics Practices and Organisational

#### Performance of Manufacturing Firms in Kenya

Ordered probit regression models were used to show the relationship between reverse logistics practices and organisational performance of manufacturing firms in Kenya. The data obtained from the respondents indicating the extent of adoption of reverse logistics practices was regressed against the elements of the firm's financial, market and organisational performance. The models which were found to be significant showed that relative to financial performance, the age of a manufacturing firm, its number of employees and whether or not it has an environmental department had a negative influence. While adoption of reuse reverse logistics was found to positively impact on financial performance, adoption of remanufacture and recycling reverse logistics were found to have an initial negative impact on it. Further, the model implied that an adoption of reuse, remanufacture and recycling reverse logistics have an accumulated probability of positively impacting on the unaccounted for factors thus registering a net positive impact on the manufacturing firms' financial performance none of these processes being significant. Lastly, the model implies that an improvement in financial performance of manufacturing firms would most probably result from increased adoption of remanufacture and recycling reverse logistics practices.

Similarly, the age of a manufacturing firm and its number of employees were found to have a probability of affecting market performance negatively though whether or not it has an environmental department affects it positively. Additionally, adoption of reuse and remanufacture reverse logistics practices registered a positive influence on market performance, though adoption of recycling reverse logistics practices had an initial negative impact. Further, the model implied that an adoption of reuse, remanufacture and recycling reverse logistics practices have an accumulated probability of positively impacting on the unaccounted for factors thus registering a net positive impact on the manufacturing firms' market performance. Lastly, the model implies that an improvement in market performance of manufacturing firms would most probably result from increased adoption of remanufacture and recycling reverse logistics practices.

With regard to organisational performance, the findings revealed that there is a probability that adoption of reuse and recycling reverse logistics practices has a negative influence on organisational performance. However, remanufacture reverse logistics was found to positively impact on its performance. Similarly, the age of a manufacturing firm as well having an environmental department was found to positively affect its organisational performance though its size affected the performance negatively. Lastly, the model showed that an improvement in the quality of organisational performance was mainly due to a probable enhanced remanufacture reverse logistics practices of the manufacturing firms.

### **5.3 Conclusion**

From the foregoing discussion it can be concluded that manufacturing firms in Kenya have adopted reverse logistic practices to appreciable levels. These practices on adoption tended to have variable effects on financial, market and overall performance of the firms according to the ordered probit model used. Ultimately, enhanced organisational performance of manufacturing firms were found to be dependent on increased adoption of remanufacture and recycling reverse logistics practices with minimal adoption of reuse reverse logistics practice. This finding conforms to that of Langat (2012) who observed that implementation of reverse supply chain practices significantly influences organizations' financial performance. Similarly, Serut (2013) found that there exist a positive relationship between implementation of reverse logistics practices and organizational performance an assertion also supported by Gitau (2010) in a study on the effects of reverse logistics on the performance of East African Breweries.

#### **5.4 Recommendations**

It is therefore recommended that the management of various manufacturing firms consider putting in place targeted measures intended to spur adoption of reverse logistics practices. Though the findings show that adoption of the reverse logistics practices is fairly good, the attention of stakeholders needs to be concentrated on a few areas. These include ensuring that all manufacturing firms create and support an environmental department within their firms tasked with monitoring the process of adoption of reverse logistics practices. Similarly, the firms should enhance particular elements of reverse logistics practices such as generation of energy from renewable sources of energy, designing products for reuse and setting up repair workshops.

## **5.5 Suggestion for further research**

The following areas are suggested for further study. To begin with, a study of factors affecting adoption of reverse logistics practices in manufacturing firms in Kenya with specific focus on reuse, remanufacture and recycling reverse logistics practices is suggested to provide more insight on this area of study. Secondly, a comparative study of the factors affecting adoption of reverses logistics in selected firms from different sectors in the Kenyan economy is suggested. Lastly, a study on the effects of adoption of reverse

logistics practices on service delivery by the manufacturing firms in Kenya is also suggested as a way of improving the quality of service provision.

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## **APPENDICES**

## **Appendix I: Letter of Introduction**



## UNIVERSITY OF NAIROBI MOMBASA CAMPUS

Telephone: 020-8095398 Telegrams: "Varsity", Nairobi Telex: 22095 Varsities Tel: 020 8095398 Mombasa, Kenya

DATE: 1<sup>ST</sup> SEPTEMBER, 2014

#### TO WHOM IT MAY CONCERN

The bearer of this letter, **Muttimos Alfred Eshikhati** of Registration Number **D61/77013/2012** is a Master of Business Administration (MBA) student of the University of Nairobi, Mombasa Campus.

He is required to submit as part of his coursework assessment a research project report. We would like the student to do his project on **relationship between reverse logistics practices and organizational performance of manufacturing firms in Kenya.** We would, therefore, appreciate if you assist his by allowing his to collect data within your organization for the research.

The results of the report will be used solely for academic purposes and a copy of the same will be availed to the interviewed organization on request.

Thank you.

MM Joseph Aranga

Assistant Coordinator, School of Bisiness-Mombasa Campus

## **Appendix II: Questionnaire**

#### Declaration

This research intends to determine the extent to which manufacturing firms in Kenya have adopted reverse logistics practices. It aims to determine the relationship between reverse logistics and manufacturing firms in Kenya. The information obtained from this survey shall be kept confidential, and shall be used strictly for academic purposes only. Your participation in this survey shall be highly appreciated.

#### SECTION A: GENERAL INFORMATION

Please indicate the following data that characterize your company

- 1. What is the ownership status of your firm? (tick one)
  - [] Fully locally owned
  - [] Fully foreign owned
  - [ ] Joint locally and foreign owned
  - [ ] Other (please specify)
- 2. In which sub-sector does your firm operate in? (tick one)
  - [ ] Service & consultancy
  - [] Building, Mining & Construction
  - [] Chemical & allied sector
  - [] Energy, Electrical & Electronics
  - [] Food & Beverages
  - [] Leather & Footwear
  - [] Metal & Allied Sector
  - [] Motor Vehicle & Accessories
  - [] Paper & Board Sector
  - [] Pharmaceutical & Medical Equipment
  - [] Plastics & Rubber
  - [] Fresh Produce
  - [] Textile & Apparels
  - [] Timber, Wood & Furniture
- 3. How long has your firm been operating? \_\_\_\_\_ Years.
- 4. What is the size of the staff of your company (both full and part-time)? \_
- 5. Does your firm have environmental management department? (tick one)
  [] Yes
  [] No
## SECTION B: REVERSE LOGISTICS PRACTICES

6. Indicate the extent to which your firm has implemented the following reverse logistics practices.

[1] Not at all [2] Small extent [3] Moderate extent [4] Great extent [5] Very great extent.

Reverse Logistics Practice	1	2	3	4	5
Reuse					
1. Return used products and packaging to suppliers for reuse.					
2. Set quality standards for reuse					
3. Generate energy from renewable sources of energy					
4. Design product for reuse					
Remanufacture					
5. Has set up repair workshops					
6. Train employees on repair and refurbishing					
7. Has set up warehouses for storage of parts					
8. Has a warranty for its products					
Recycling					
9. Return used products and packaging to suppliers for recycling.					
10. Create awareness to the public about recyclable products					
11. Well documented recycling policy					
12. Structured market incentives					

## SECTION C: ORGANIZATIONAL PERFORMANCE

7. To what extent has your firm experienced an increase in the following financial performance outcomes as a result of adopting reverse logistics practices?

[1] Not at all [2] Small extent [3] Moderate extent [4] Great extent [5] Very great extent

Financial Performance measures	1	2	3	4	5
Gross Profit Margin					
Return on Investment					
Return on sales					
Ability to Fund Business Growth from					
Profits					

8. To what extent has your organization experienced the following marketing performance outcomes as a result of adopting reverse logistics practices?

[1] Not at all [2] Small extent [3] Moderate extent [4] Great extent [5] Very great extent

Market Performance measures	1	2	3	4	5
Market share growth					
Sales volume growth (in units)					
Sales growth (in shillings)					

## THANKS VERY MUCH FOR YOUR COOPERATION

## **Appendix III: List of Companies**

1. ABB Electric Company

- 2. Aluminium Africa Ltd
- 3. Atlas Copco Kenya Ltd
- 4. Bata Shoe Company (Kenya) Ltd
- 5. Bayer East Africa
- 6. Best foods Kenya Ltd
- 7. Coca-Cola
- 8. Colgate Palmolive (EA) Ltd
- 9. Essence International
- 10. East African Breweries Ltd
- 11. General Motors East Africa
- 12. Gillette
- 13. Haco Indusries
- 14. Henkel Kenya Ltd
- 15. Nestlé Foods
- 16. Procter and Gamble EA Ltd
- 17. Siemens Ltd
- 18. Tetra Pack
- 19. Glaxo Smithkline Kenya Ltd
- 20. Cargill Kenya Ltd
- 21. BAT Industries United
- 22. Unilever Tea Kenya Ltd
- 23. Chandaria Industries Limited
- 24. Orbit Chemicals Industries Limited.
- 25. Topen Industries
- 26. Weltech Industries.
- 27. Osho Chemical Industries
- 28. Bamburi Portland Cement Company (BPCC)
- 29. East African Portland Cement (EAPC)
- 30. Kenya United Steel Ltd (KUSCO)
- 31. Rolmil (Kenya) Ltd
- 32. Associated Steel Company Limited
- 33. Panpaper
- 34. East African Packaging Industries (EAPI)
- 35. Sona Holdings
- 36. Oil Libya
- 37. Kenol Kobil
- 38. Bidco Oil Refineries,

39. KAPA Oil Refineries, 40. Timsales 41. Chef Cookies 42. Nairobi Timber 43. Twiga Chemicals 44. Cadburys 45. Insteel 46. Tuzo 47. Henkel 48. Kridha **49.Ebrahims Electronics** 50. Nokia 51.Volvo 52. Victoria 53.Karatasi Brand 54. House of Manji 55. Alpha Fine Foods Ltd 56. Associated Paper & Stationery td 57. Beta Healthcare International 58. KCC 59. Crown Berger 60. Athi River Mining 61. Mabati Rolling Mills 62. Palmac Oil Refiners, 63.Pwani Oil Refiners 64. Unilever 65.SMEC International (Pty) Ltd. 66. Associated Motors K. Ltd 67. Patal foods 68. Sameer Investments Ltd 69. Skyfall Investment Ltd **70.Jimbim Holdings** 71.Sunmatt Ltd 72.Basco Products (K) Ltd. 73. T.M.D Imports and Exports Ltd 74. Roto Tanks

75. Village Products Ltd.