ADDIS ABABA UNIVERSITY

SCHOOL OF COMMERCE

ASSESSMENT OF LOGISTICS PRACTICES & CHALLENGES IN ETHIOPIAN PLASTIC RECYCLING COMPANIES

BY
YIRGA TEKLE

June, 2018
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A thesis Proposal submitted to the Department of Logistics and Supply Chain Management, School of Commerce, Addis Ababa University for the Partial Fulfilment of the Requirements for the Award of the Degree of Master of Arts in Logistics and Supply Chain Management

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Approved by Board of Examiners

Chairman, Graduate Studies	**Signature and date**
Advisor	**Signature and date**
Internal Examiner	**Signature and date**
External Examiner	**Signature and date**

DECLARATION

I the undersigned, declare that, this thesis is my original work and has not been presented for a degree in any other University, and that all the sources of materials used for the thesis have been duly acknowledged.

Signed by: -

Name:_____

Signature:_____

Date:_____

CONFIRMATION

This is to approve that the study made by Yirga Tekle, entitled: Logistics Practices & challenges in Ethiopian Plastic recycling companies, and submitted in partial fulfilment of the requirements for the Degree of Masters of Arts in Logistics and Supply Chain Management complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

Signed by;-

Advisor name: Busha Temesgen (PhD)

Signature: _____

Date: _____

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LIST OF ACRONYMS

GHG	Green House Gas
USD	United States Dollar
FDI	Foreign Direct Investment
PLC	Private Limited Company
GTP	Growth and Transformation Plan
UN	United Nation
QR	Quick Response
SC	Share Company
IMF	International Monetary Fund
LIS	Logistics Information Systems
CRS	Customer Response System
CRM	Customer Relationship Management
CSP	Customer Service Policy
IP&M	Inventory Planning and Management
TAC	Total Acquisition Cost
OE	Orders Entry
OP	Order Processing
EPOS	Electronic Point-Of-Sale
EDI	Electronic Data Interchange
TMS	Transportation Management System
WMS	Warehouse Management System
SCOR	Supply Chain Operations Reference
3PL	Third Party Logistics
ICT	Information Communication Technology
EFT	Electronic Funds Transfer

ABSTRACT

The paper has made a study on the practices and challenges of logistics in Ethiopian plastic recycling companies with regard to customer service, inventory management, supply, transportation and warehousing activities. The main objective of the study was to describe the current logistics practices. Descriptive research type was used, and quantitative and qualitative data was collected related with the extent of companies' logistics practices using structured questionnaires and different secondary documents. Since the total population is small in number, the target population covers all the seventeen Plastic recycling companies and from logistics perspective, 3 respondents selected by using expert purposive sampling who work in main logistics activity of Purchasing, Production & Marketing and have glean knowledge in particular expertise in logistics activity. Questionnaires distributed to 48 respondents but filled and returned only from 42. Finally, the collected data was analysed using descriptive statistics, and secondary document analysis is done for confirming the findings. The result indicates almost all the modern logistics infrastructures like ERP, EDI and Radio frequency are not applied by these firms for ease of logistics operation, and commonly logistics is practiced at the lesser extent. Even though these firms practiced the logistics activities in their day to day operations, most of the firms have no logistics department in their organizational structure. Foreign currency shortages, higher taxes, lack of integrated system and long lead time in ports are found to be the critical challenges of logistics for plastic recycling companies in Ethiopia. It is recommended that, the companies can measure their logistics performance by applying different metrics like financial, productivity, quality and cycle time that help to know the gaps easily and to take corrective actions.

Key words: Logistics Practices, Logistics Challenges, plastic recycling companies.

CHAPTER ONE

INTRODUCTION

In today's fast paced economic climate, many firms increasingly realize that globalization has made the world smaller and more competitive. A change in one place impacts another quickly. Also, customers seek products that can respond well to their specific needs. As such, firms are now looking at securing cost, quality, technological and other competitive advantages as a strategy to pursue in a globally competitive environment.

One currently popular competitive advantage for firms is to promote and provide value to its customers by practicing logistics more efficiently than competitors.

Presently the competitive global market place has high pressure on business activities whether they are local or international. Logistics as the key part of global business shall be considered in particular due to the fact that it links suppliers with customers and it integrates functional entities across a company.

1.1 Background of the study

Plastics play a significant role in the environmental, societal and economical dimensions of sustainable development (Plastic Europe, 2009). Plastics are light, durable, clean and versatile and therefore have been increasingly used to make packaging, automotive, building, electronic and electrical products. If we use other materials to replace plastics, the cost and environmental impacts will more likely to increase. For example, Americans use 100 billion plastics bags a year, made from about 12 million barrels of oil; instead, the use of 10 billion paper bags each year means cutting down 14 million trees (Science World, 2008). The use of crude oil for producing plastics consumes a scarce resource (energy) but the use of paper means the reduction of the capability of the planet earth to absorb CO2.

There are a lot of research efforts in many different disciplines attempting to find technologies and ways to make a cleaner and sustainable world. Recognising the importance of plastics and the fact that plastics are made of scarce resources, there have been a lot of efforts in research and development to make plastics reusable and recyclable. From a simple question such as the use plastic or paper bags for shopping in the supermarkets to the more complex questions about the most sustainable approaches to design, manufacture, distribute, and recycle a product, more research is required to help logistics and supply chain managers to make informed decisions. Even though recycling is believed to conserve materials and reduce greenhouse gas (GHG)

emission, recycling activities involve transportation and production activities which consume energy and natural resources and simultaneously produce emissions/pollutions. Without understanding of the environmental impacts of recycling logistics systems, managers will not be able to make better decisions on product design, production, distribution, choice of materials, and the design of recycling logistics systems. Understanding of the environmental impact of various logistics solutions for managing product life cycle including product end-of-life (EOL) is a crucial step towards a cleaner and sustainable world.

All production and consumption activities engage in create waste that is costly to handle and environmentally damaging. Environmental impact is one of the most pressing issues facing logistics and transport managers today. Since the last two decades there has been an increasing effort to examine better approaches and logistics systems to reduce congestion, conserve natural resources and reduce emission. Research in this area predominantly focuses on the 'forward' supply chain i.e. the movements of goods from the origins of goods to the end consumers. However, the consideration of a 'forward' supply chain without the end-of-life (EOL) or 'reverse' flow is simply inadequate in helping logistics and transport managers to make informed decisions. Even though reuse and recycling are recognised as essential means to conserve natural resources and reduce GHG emission, such activities involve transportation and production which consume energy and produce emissions/pollutions. Without understanding the environmental impacts of recycling logistics systems, managers will not be able to make better decisions on product design, choice of materials, and the design of recycling logistics systems. It is therefore essential to understand the environmental impacts of various logistics solutions for managing product end-of-life (EOL).

Effective logistics operations can lead to more efficient operations that increase the firm's competitiveness and increase customer loyalty where distances are frequently greater and many environmental barriers increase the complexity and uncertainty of worldwide operations (Cilliers and Nagel, 1994 as cited in Mark Goh, 1998).

Analysing and assessing logistics practices will help discern important issues such as emerging trends and areas of concern, which will help in taking remedial measures (Srivastava, 2006 as cited in Fekadu, 2013).

Cilliers and Nagel (1994) in their study concluded that to succeed today and to pave the way for a better future, Ethiopian plastic recycling companies need to create strong linkages with their business partners using better logistics practices that can enhance a country's

competitiveness and ability to attract foreign investments relative to its neighbours' (Cilliers and Nagel, 1994 as cited in Mark Goh, 1998).

Ethiopian government want to put a regulation that it was banning the importation of plastic bags as part of the countries green growth initiatives. The best solution is having plastic recycling industries in the country because of many reasons that include, more jobs, greener environment, technological experience and related research and innovation. The objective is reclaiming of thermoplastic materials to their original state of polypropylene, polyurethane, polystyrene or polyvinyl chloride granules and powder. This reclaiming of waste plastic materials to their original state enables, with proportionate compounding of additives and filters, the availability of locally of the raw material used in the manufacture of PVC floor tiles, ball point pen cases, switch boxes, crates, cups an extruded pipes, sewerage PVC pipes and plastic twines or ropes.

The demand for products which are from reprocessed waste plastic materials has been increasing at a faster rate during the last 10-15 years. This is particularly true for products such as plastic crates, plastic cups and plates, extruded pipes, PVC floor tiles, plastic ropes. If discarded plastic products are reclaimed and restored to their original state, the restored material could be used to produce the above products here at home.

1.2 Statement of the Problem

According to the research conducted by Ministry of Industry (2010), even though the plastic recycling companies benefit from duty- free privileges for the importation of machinery and spare parts, it has limited value since the manufacturers are not productive enough. This shows that plastic recycling companies are facing problems beyond than finance shortage and lower productivity.

Among the major problems contributing for the poor performance of this industry, lack of adequate knowledge and skills in managing logistics practices is the critical one (Industry Minister Annual report, 2010).

Most of Ethiopian recycling companies are not able to be competitive in the international market like China and India who are well known in the sector since there is low quality of recycling process and products due to lack of adequate skill and knowledge, power and financial problems and high logistics related problems (Industry Minister Annual report, 2010).

Effective logistics operations can lead to more efficient operations that increase the firm competitiveness and increase customer loyalty where distances are frequently greater and many

environmental barriers increase the complexity and uncertainty of worldwide operations (Cilliers and Nagel, 1994 as cited in Mark Goh, 1998).

The study done by Fekadu (2013) on logistics practices of Ethiopia was mainly focused on the transportation and customer service practices using general attributes of infrastructure, performance, information system, human resources, business and political environments.

He indicated that Ethiopian logistics system is characterized by poor logistics practices and lack of coordination of goods transport, low level of development of logistics infrastructure and inadequate fleets of freight vehicles in number and age, damage and quality deterioration of goods while handling, transporting and storage.

Even though there is a study done by Fekadu (2013) on Ethiopian logistics practices he does not give emphasis specifically for all main logistics practices like inventory management, supply and warehousing.

This shows that the research is highly focused on the transportation part of logistics and ignored other main logistics activities. There is also no study made to assess the logistics practices and challenges, specifically in plastic recycling companies in Ethiopia.

Analysing and assessing logistics practices will help discern important issues such as emerging trends and areas of concern, which will help in taking remedial measures (Srivastava, 2006 as cited in Fekadu, 2013).

To make the industry effective and competitive, plastic recycling process require strong logistics activity. Differing from other industries, the recycling process get raw material from 'Qurali' and waste collectors who collect different types of plastic wastes from different place.

Cilliers and Nagel (1994) in their study concluded that to succeed today and to pave the way for a better future, Ethiopian plastic recycling companies need to create strong linkages with their business partners using better logistics practices. A good logistics practice can increase a country's competitiveness and ability to attract foreign investments relative to its neighbours' (Cilliers and Nagel, 1994 as cited in Mark Goh, 1998).

Therefore, studying the current logistics practices of medium and large plastic recycling companies in Ethiopia is very essential to make improvements on the poor logistics practices, for revising policies, and to add information for further researches.

1.3 Research questions

This study answered the following basic research questions

- What are the current logistics activities that practiced by plastic recycling companies?
- What logistics challenges faced by the companies the logistics activities?
- What are the environmental concerns of plastic recycling companies in Ethiopia?
- How plastic recycling companies manage their long lasting relationship with customers?
- In what criteria plastic recycling companies select their suppliers?

1.4 Objective of the Study

1.4.1 General Objective

The general objective of the study is to describe logistics practices in Ethiopian plastic recycling companies.

1.4.2 Specific Objectives

The specific objectives of the study are:

- To describe current logistics activities that practiced by plastic recycling companies
- To point out logistics challenges that affect the logistics activity of the companies.
- To describe the environmental concerns of plastic recycling companies in Ethiopia.
- To describe the criteria in which plastic recycling companies manage their customers
- To point out criteria's that used by plastic recycling companies in order to select supplier

1.5 Significance of the study

The study has a great significance for the plastic recycling companies, Government policy makers and investors. The plastic recycling companies will be benefited since the outcome of the study helps them to easily understand the gap on their logistics practices and take corrective actions that can enhance their capacity to compete with best plastic recycling companies in the world. It will also help these firms to identify, evaluate and monitor the key areas which can help them to maintain their pace and speed of their logistics success. The government policy makers will benefit also from the outcome since it will assist them in examining the current policies towards the plastic recycling sectors and improve them accordingly. The findings of this study can also provide prospective investors with a realistic idea and informational base of

what to expect when working in the plastic recycling sector of Ethiopia. Additionally, this study will serve as a point of departure for further research by academicians.

1.6 Scope of the study

The study focuses on Plastic recycling companies that come to Ethiopia as Foreign Direct Investment (FDI) and those domestic Plastic recycling companies that are engaged in processing and distributing to local market and also for export market. They are selected since they involve in the practices of the main logistics activities that the study frame work is organized. In addition to this they are the direct beneficiaries of the outcome of this research.

There is a great potential on plastic industries that produce for the domestic and international markets only with limited capital and labour force in improving the overall plastic recycling companies' performance and in developing the country's economy, this study also focus on these small scale plastic recycling companies which start operation in recent years with trivial capital.

The logistics practices of Ethiopian Plastic recycling companies are empirically studied based on the best practices and recent trends in logistics taking the five main logistics activities as a conceptual frame work. These are

i. Customer service; in logistics activity, customer service is a process for providing significant value added benefit to the companies in a cost-effective way. Some of the activities are respond quickly to the customers need, fulfilling customer order as per the promised date, proper invoicing and collection method and proper handling of customer complaints.
ii. Inventory management; it manages the activity of supervises the flow of raw materials from 'Quralio' and waste collectors who collect the used plastic products to warehouses and from these facilities to point of sale. A key function of inventory management is to keep a detailed record of each new or returned product as it enters or leaves a warehouse or point of sale.
iii. Supply; this activity essential help for plastic recycling companies. Since this industry sector may face shortage of raw material due to the poor activity of waste collectors. In order to activate the industry, the supply activity should support by effective communication and financial support to the suppliers.

iv. Transportation; it is the back bone for logistics activity for the companies. There is a big shortage of conveying collected plastic products from different place to the recycling companies which may occur due to financial and proper truck shortage.

v. Warehousing; the activity of properly receiving and handling of goods and make ready for production. Most of the collected plastic products are different colour and material application. Sorting is crucial in ware house for healthy production and also getting proper end product.

For describing the logistics challenges in plastic recycling companies, the logistics challenges classification used by Neil (2011) was used.

1.7 Limitation of the study

Since the research is focused on the selected frame work of logistics activities, it is difficult to generalize the finding of the study to all other logistics activities that are described by different researchers and authors. Since the study area is new in Ethiopia that faced shortage on access of related data. So to improve generalizability the study can be replicated for other logistics activities. It is also difficult to generalize the findings of the study for other industry sectors in Ethiopia. To improve generalizability, the study could also be replicated in other industry sectors.

1.8 Definition of terms

Plastic recycling; refers to the process of recovering scrap or waste plastic and reprocessing the material into useful products (Chee Wong, 2010).

Medium scale Plastic recycling companies: means a firm having a total employee of, excluding contract employees, from 50 to 250.

Large scale Plastic recycling companies: means a firm having a total employee of, excluding contract employees, above 250.

1.9 Organization of the Study

The study organized in five chapters. The first chapter covers the introduction part that addressed the background information concerning plastic recycling companies, the research questions, the general and specific objectives of the research, the significance and scope of the research, and finally the limitations of the research. Following this introductory chapter, the second chapter comes; it described the basic and relevant literatures related to logistics practices and challenges that are done previously by other researchers.

In the third chapter the research report covers the type of research design used, the analysis of the data, the sampling techniques, and methods of data collection applied. The fourth chapter

focuses on the descriptive data analysis and findings of the study. The last chapter provides summary of findings, conclusion and recommendations so as to solve the observed gaps and to accelerate the development of the leather footwear manufacturing firms through better logistics practices.

CHAPTER TWO

LITERATURE REVIEW

2.1. Introduction

The literature of the study covers an explanation about the basic concepts which provide definition for logistics and the recent trends in logistics. The review also discussed about the general practices of logistics and the logistics challenges in different countries manufacturing firms. The theoretical and empirical literatures are presented and also conceptual frame work of the study included in this chapter. Although, in the review of empirical studies, it was difficult to get many literatures that are matched with the title of the study, the basic findings from some related studies are included.

2.2 Theoretical Review

Frazelle (2002) indicated that a world-class logistics organization can be characterized by extensive use of logistics key performance and financial indicators, use of integrated logistics information systems, strategic use of logistics service and educating providers, a sense of urgency to leapfrog to world-class status, strategic use of third-party logistics providers, human-friendly logistics via logistics ergonomics and green logistics, order and discipline, justifiable use of automated storage and handling systems, and excellent land and building utilization

2.2.1 Definitions of Logistics

Logistics is defined by council of logistics management as the process of planning, implementing and controlling the efficient, effective flow and storage of goods, services and related information from point of origin to point of consumption for the purpose of conforming to customer requirements. The integration of two or more logistics with in a network to create value, enhance efficiency and satisfy customers is called supply chain management (Fekadu, 2013).

On the other hand, logistics is defined in the Council of Supply Chain Management Professionals' Supply Chain Management Terms and Glossary (2010, 114) as:' The process of planning, implementing, and controlling procedures for the efficient and effective transportation and storage of goods including services, and related information from the point of origin to the point of consumption for the purpose of conforming to customer requirements.'

Tilanus (1997) also defines Logistics as 'the process of anticipating customer needs and wants; acquiring the capital, materials, people, technologies, and information necessary to meet those

needs and wants; optimizing the goods- or service-producing network to fulfil customer requests; and utilizing the network to fulfil customer requests in a timely way'. Simply to say, 'logistics is customer-oriented operation management'.

2.2.2 The Role of Logistics practices

Logistics' role is to provide time and place utilities. Time and place Utilities facilitate the creation of global scale and scope economies while enhancing a firm's ability to provide high levels of seamless customer satisfaction (McGrath and Hoole, 1992). Similarly, Ronald (1997) argues that for many firms throughout the world, logistics become an increasingly important value-adding process for a number of reasons. Concerning logistics practices Lambert & Stock (2001) argues that good logistics practices can create a competitive advantage. More specifically they claim that best logistics practice plays an important role in three critical elements of the marketing concept. These elements are customer satisfaction; integrated effort and company profit (Lambert & Stock, 2001 as cited in Anna and Konrad, 2008).

Generally, the above arguments indicated that good logistics practice is increasingly recognized as the key enabler, which allows a company to gain and maintain its competitive advantage and ensure maximum customer satisfaction.

2.2.3 Logistics activities

The scope of logistics practices has been extended beyond its traditional coverage of transportation and warehousing to include packaging, labelling, assembly, purchasing, distribution, manufacturing, finance, customs clearance, and other forms of customer service (Luchen, Theo notteboom, 2011).

A common way to structure a company, from a logistics perspective, is in three main activities: procurement, operations and distribution (Aronsson, 2004; Christopher, 2005).

However, the typical elements of logistic activities, such as customer services, sales forecasting, distribution communications, stock control, materials handling and ordering, amongst others, may give companies competitive advantages, especially when based on the exchange of reliable information between the links in the chain (Bowersox, Closs and Drayer, 2005, as cited in Wescley and Ricardo, 2011).

Similarly, there are thirteen key logistics activities that are involved in the flow of products, from point of origin to point of consumption: these are customer service, demand forecasting, inventory management, logistics communications, material handling, order processing, packaging, parts and service support, plant and warehouse site selection, procurement, reverse logistics, traffic and transportation, warehousing and storage (Lambert & Stock, 2001 as cited in Anna and Konrad,

2008).A narrow and more traditional view of manufacturing logistics includes the planning, scheduling and control of all activities resulting in the acquisition, processing, movement and storage of inventory (David, Robin, Robert and Louis, 2007).

On the other hand, Frazelle (2002) and Kent (2001) states that logistics is comprised of five interdependent activities; these are customer response, inventory planning and management, supply, transportation, and warehousing.

The study made by Ismail, Halil, and Mustafa (2012) on the role of logistics for regional development used the above logistics activities that are described by Kent (2001) and Frazelle (2002).

Customer Response

According to Frazelle (2002) the logistics of customer response includes the practices of developing and maintaining a customer service policy, monitoring customer satisfaction, orders entry (OE), order processing (OP), and invoicing and collections.

Ronald (1997) argues that customers have been increasingly sensitized to expect quick response to their demands. He pointed out that rather than consumers having to accept the "one size fits all" philosophy in their purchases, suppliers are increasingly offering products that meet individual customer needs. This showed that the level of customer satisfaction shall be measured to make the required corrective action. Similarly, Frazelle (2002) argues that in today's just-in-time world the ability to respond to customers' requirements in ever-shorter time-frames has become critical. Most authors and practitioners agree that building and enhancing long-term relationships with customers generates positive returns to firms (Reichheld, 1993, 1996 as cited in Jones, Fox and Fabrigar, 2010).

Inventory Management

Frazelle (2002) indicated that the logistics of inventory management includes practices of forecasting, order quantity engineering, service level optimization, replenishment planning, and inventory deployment.

The study by Sahay and Ramneesh (2003) found that some of the major reasons for holding inventories by Indian organizations include: improving customer service; hedging against price changes and contingencies; achieving production, purchase and transportation economies; protecting against demand and lead time uncertainties; and balancing supply and demand.

On the contrary, Womack and Jones (1996) argued that in lean supply chain thinking, inventory is regarded as one of the seven "wastes "and, therefore, it is considered as something to be reduced as much as possible.

Similarly, the study by Dimitrios (2008) suggested that too much inventory consumes physical space, creates a financial burden, and increases the possibility of damage, spoilage and loss.

Martin (2011) described that many companies still think that the only way to service customers who require just-in-time deliveries is for them, the supplier, to carry the inventory instead of the customer.

According to the state of logistics report (2004) fifty per cent or more of a company's current assets will often be tied up in inventory. Františekněmec (2003) on his study found that with the increasing emphasis and interest in logistics and supply chain management, continuous replenishment and just in-time programs, good inventory information is mandatory, not optional, for success in today's competitive markets.

Frazelle (2002) also describes world-class practice in inventory deployment as optimal inventory positioning, dynamic redeployment, postponement, and Materials requirements planning (MRP). According to Orlicky (1975) MRP system consists of a set of logically related procedures, decision rules, and records designed to translate a master production schedule into time-phased net requirements and the planned coverage of such requirements for each stock point.

The study made by Vikram and Prakash (2012) in Australian hospital logistics and supply chains found that application of collaborative arrangements between manufacturers and wholesalers/distributors would improve inventory management practices across the supply chains. Kazim (2008) also confirmed that elimination of errors in inventory records is more crucial and important for successful logistics practices.

Supply

According to Frazelle (2002) the logistics of supply include developing and maintaining a Supplier Service Policy (SSP), sourcing, supplier integration, purchase order processing and buying and payment. He also mentioned that the world-class sourcing practices include Make-buy analysis, total acquisition cost analysis, global sourcing, and electronic bid-based sourcing. In addition to this, World-class practices in buying and payment include central buying-local delivery, buying partnerships, and electronic funds transfer.

The study by Fasika, Klaus and Marcus (2014) on Ethiopian manufacturing industries supply practice found that most of companies have prepared a standard contract for all suppliers.

However, it was common practice to ignore the contract and go to new buyers if they have got a price advantages.

In relation to this they found also most of the respondent companies practiced price negotiation and direct purchase for local material from wholesaler and the companies used different supplier

selection criteria such as the quality of material, price, delivery time, previous experience, and reliability of suppliers especially for international suppliers.

Transportation

Transportation physically links the sources of supply chosen in sourcing with the customers we have decided to serve chosen as a part of the customer service policy (Frazelle, 2002).

Similarly, Frantisek (2003) describes transportation as a basic element of the logistics activities which runs from vendors through to you, to your customers.

Transportation plays a connective role among the several steps that result in the conversion of resources into useful goods in the name of the ultimate consumer (Fair, M. and Williams, 1981).

Frazelle (2002) states, the objective of transportation as to link all pick-up and delivery-to points within the response time requirements of the customer service policy and the limitations of the transportation infrastructure at the lowest possible cost.' On the other hand, Tyndall and colleagues (1998) argues that the most significant advances in modern logistics practices have not been in cost reduction, but in improved processes to move goods and material between nations in a timely and seamless manner.

The study by Bemnet (2004) on Ethiopian transport system explored that transport costs are very high in Ethiopia. For instance, in garment processing trade, overall transport cost cover 28 percent of the total value added. This is a high proportion compared to the world average and Africa's average which are 6.1 and between 15 and 20 percent respectively.

According to the World Bank Report (1991) efficiently organized flows of goods and information are only possible if there is a well-developed transport and communication infrastructure. The report also described that in sub-Saharan African countries, this infrastructure is poorly managed and maintained. Until recently about half of the region's paved roads and 70 percent of its unpaved roads were only in a fair to poor condition and required substantial repair.

Warehousing

Warehouse management includes all planning and control procedures to operate the warehouse (Slack, 2001 as cited in Faber, 2013). Similarly, Frazelle (2002) indicate that the logistics of warehousing includes receiving, put away, storage, order picking and shipping. The objective of warehouse management is to efficiently and effectively coordinate all warehouse processes and activities (Harmon, 1993; Tompkins, 2003 as cited in Faber, 2013).

Generally, Faber (2013) concluded that warehouses that operate in more turbulent markets are likely to have to continually modify their products and services in order to satisfy customers' changing preferences.

Receiving, transferring, handling, storage, packing, and expediting operations at the warehouse directly affect the effectiveness of a company as a whole as well as its quality and logistic service level (Rafele, 2004 as cited in Anna, Alberto and Carlo, 2011).

In this sense, a proper warehouse management practice has become critical to gain competitive advantage through better customer service and shorter lead times (De Koster, 1998 as cited in Anna, Alberto and Carlo, 2011).

According to the study made by Hilmola and Lorentz (2011) warehouses and distribution canters have an important role in international logistics practices. They argued that these may simply serve markets or hold inventory, and therefore, provide means for achieving appropriate customer service in the international environment, prone to long lead times and disruptions.

Market volatility, unpredictable demand, and impulse purchasing approaches make the fashion shoe business turbulent and dynamic. These qualities demand short manufacturing and distribution lead times, which can be achieved through a variety of means, such as automated warehousing, fast transportation, and improved manufacturing methods (Fisher and Raman, 1996 as cited in Anna, Alberto and Carlo, 2011).

The study conducted by Belarmino and Fernando (1999) explored that high efficiencies are gained after implementing Radio Frequency Identification in warehouses, including a reduction in the number of movements, the number of errors, the stocktaking, less paperwork, and a more rapid invoicing.

According to Blanchard (2007) Sixty-three percent of North American companies outsource at least some of their warehousing to a third party, a clear indication that they do not consider warehouse management to be one of their core competencies.

The study was conducted by Rogers and colleagues (1996) to check whether the use of information technology affects performance of warehouses or not.

They conducted a survey including both public and dedicated warehouses. Their findings suggest that the use of information technology is related to several positive outcomes, such as improvement of quality, cycle times might be reduced as well as an increase in productivity.

2.3. Recent Trends in Logistics Practices

The volatility of the business environment, intense competition and improvements in technology has introduced dramatic changes to the logistics practices (J. Roy, 2001as cited in Shiromi, 2008). Some of the major recent trends in logistics practices described by different scholars are:

2.3.1. Quick Response (QR)

QR is the umbrella term for the information systems and the logistics practices that combine to provide 'the right product in the right place at the right time' (Martin, 2011).

Birtwhistle (2003) defined and discussed the level of quick response (QR) implementation by fashion retailers by exploring its impact on replenishment processes. He found that information technology is particularly important in driving customer responses Birtwhistle, 2003 as cited in Walters, 2008). Walters (2008) also argues that demand chain management with effective response management results in high level of customer satisfaction.

The study also carried out by Marcia (2000) on the experiences of 50 manufacturing companies participating in a Government-funded program in Australia found that development of effective logistics practices will require the adoption a range of QR enabling practices and technologies by manufacturers and upstream suppliers.

2.3.2. The development of Electronic Commerce

Fax, Email, voice mail, Electronic Funds Transfer (EFT), internet, intranet, image processing, barcode and electronic data interchange (EDI) uplift the standard of logistics practices (Glauser, 2005 as cited in Shiromi, 2008).

A survey made on 200 top managers of logistics and transportation in the United States pointed out that information and communication technologies are the most important success factor in their domain (James and Williams, 1999, as cited in Shiromi, 2008).

Similarly, Srivastava (2006) on his study indicated that the Indian economy is currently experiencing a boom in logistics sector due to the rapid growth in ICT.

The logistics information capability to facilitate seamless flows of timely information is crucial in improving the efficiency of logistics practices and it can even reduce the demand for better transport infrastructure (Kang and Kwong, 1997 as cited in Goh and Pinaikul, 2002).

2.3.3. Outsourcing of logistical services to third party providers

According to Shiromi (2008) with the globalization of markets, companies are increasingly focusing on their core competencies. He argues that if they feel logistics practices of the organization do not add adequate value, or in the worst case the function dilutes the overall value they would not hesitate to outsource it to a 3rd party logistics facility.

2.3.4. Cross Docking

As Shiromi (2008) pointed out cross docking is the practice of expediting the flow of product from receiving to shipping with a minimum of handling in between. To enable proper Cross-Docking system, he indicated that there should be sound processes, supply chain relationships and clearly

established systems like automated material handling, Warehouse Management Systems (WMSs), order processing systems, and quality controls systems.

2.3.5. Collaborative Planning Forecasting and Replenishment (CPFR)

According to Framling and Smaros (2001) CPFR is a model that offer guidelines for developing collaborative processes that enable trading partners to do joint planning and demand forecasting, and to synchronize their material flows according to end-customer demand.

2.3.6. Human-Friendly Logistics

According to Frazelle (2002) human-friendly logistics is based on the Golden Rule—treat people the way you would like to be treated. The logistics information capability to facilitate seamless flows of timely information is crucial in improving the efficiency of logistics practices and it can even reduce the demand for better transport infrastructure (Kang and Kwong, 1997 as cited in Goh and Pinaikul, 2002).

2.4. Empirical Review

As per Samir K. Srivastava report which present for October 15-17, 2006, the 6th Guttmann conference centre, USA, India is the fourth largest country in terms of Purchasing Power Parity (PPP) and constitutes one of the fastest growing markets in the world. Globalization of businesses, infrastructural bottlenecks, increasing uncertainty of supply chain networks, shortening of product life cycles and proliferation of product variety have forced Indian firms to look beyond their four walls. They face issues related to choosing and working with the right supply chain partners (suppliers, customers and logistics service providers), fostering trust between them and designing the right system of gauging performance.

The de-regulation of the Indian economy in the 1990s has attracted global players and has unleashed a new competitive spirit. However, a distinctive characteristic of the Indian economic environment is the inadequacy of basic inputs normally required to support organized economic activity. The UPS Asia Business Monitor Survey, 2004 (Available at: http://www.etintelligence.com/) finds that besides the lack of government support, poor logistics infrastructure and poor supply chain efficiency are the major obstacles to competitiveness in India. The Indian infrastructure comprising roads, railways, airports, seaports, ICT and energy production is poorer as compared to many other countries. However, things are changing for the better at a fast pace. The Growth Competitiveness Index survey conducted by the Geneva-based World Economic Forum (WEF) for 2005-06 puts India at 50th position among 117 countries in its

Global Competitiveness Report, five places up from previous years ranking of 55. (Available at: http:// /www.weforum.org/)

Industry and academic estimates put logistics and SCM spend in India at approximately 13% of the Gross Domestic Product (GDP). Global estimates for this vary and are around 13% of GDP in China and about 9% of GDP in the US. The transportation cost in India accounts for nearly 40% of the cost of production, with more than half the goods being moved by road. Trucking accounts for nearly 70% of transportation and accounts for 60% of all logistics cost. 67% of truck ownership is in the hands of small unorganized players. Road is followed by rail and finally coastal shipping. Rail has been steadily losing ground due to myopic government strategies and inherent inefficiencies.

Donald and David (1997) argued that logistics is about streamlining or reconfiguring operating systems to become more customers relevant and such customer relevancy increases are achieved simultaneously with increased quality and productivity.

Their study on logistic practices of Brazil found that the Brazilian economy is stabilizing and many firms, both domestic and international, are viewing Brazil as the primary focus of their manufacturing and distribution strategy. This was due to the fact that the country logistics is characterized by less delay in ports, availability of a nice infrastructure, and modern information management systems.

The study by Dr. Obiora Madu (2016), Nigeria is among the lowest cost crude oil producer, and with international oil prices fixed in US Dollars, couldn't care less, until now, that the economy faces total melt down with the steep drop in oil prices. According to WTO, transaction cost of the type amenable to trade facilitation, can be as high as 10 – 15% of our total trade volumes which considering import and export alone is $15b - $21.6b (Import $61.6b, Export $82.6b, Total $144.2b,2014).

Transportation, warehousing, cargo consolidation and border clearance costs, form a critical component of the price of our commodities, and hence our Global Competitiveness, creating the urgent need of an effective National Logistics Strategy.

The Logistics sector is estimated at well over N200b and grows at an annual rate of 10%. Deregulatory pressures and investment have led to increased professionalization and modernization of the haulage and logistics companies with most heavy manufacturers outsourcing the transportation of their products and the government concessioning out large maritime (ports) and inland assets.

The ever changing industry profile of the foreign and domestic players and clearly illustrated how regulatory pressure and adoption of ICT platforms have brought growth, increased scale, automation and competitiveness to become even more profitable and attractive to institutional and private investors. The future remains bright as the industry is forecast to grow by 5.19% to 157.3bn in 2016 in the African Continent and for Nigeria the growth has somewhat slowed from 6.1% (2004 – 2009) to 4.8% (2009 – 2014) with the dominant modes remaining Road Freight Haulage (51.5%) and Sea Shipping (43.9%). Over 80% of heavy duty haulage in Nigeria is by Road. This obvious imbalance is predicated on the collapse of rail haulage in Nigeria.

The study by Fekadu (2013) on the logistics practices of Ethiopian found that the density and quality of transport infrastructure is very low, the main freight transport companies lack capacity in terms of skilled human resource, management skills and number of fleets of vehicles, the main/big companies are government owned that will result in inefficiency, the efficiency of customs authority is very low and this causes a lot of delays at check points, and the number of days required to get foreign currency from national bank is also very long.

The research done by Fasika, Klaus and Marcus (2014) on selected 12 types of Ethiopian manufacturing industries, on the characteristics of supply chain and logistics found that customer's comments and complaints collection were done mostly with help of data log manually and the level of practice of customer service is very less.

They also found that although the companies have to set rules for effective negotiation procedure, procurement department's officers who were directly participating in purchasing cannot follow all rules because the marketing situations are highly variable and dynamic especially with raw material price.

In their study they also found that the supplier evaluation is largely based on minimum cost and contract breakdown will be done for minor price changes.

Concerning transportation most of the companies were using their own transport facilities to transport and distribute the final product to local customers. Some of the companies have started using third party logistics (3PL) providers for their distribution functions.

2.5. Logistics Challenges

A Cambridge dictionary defines the word “Challenge” as (the situation of being faced with) something that needs great mental or physical effort in order to be done successfully and therefore tests a person's ability.

According to Dinh and Hinh T. (2014) poor trade logistics penalize firms that rely on imported inputs and doubly affect exporters, causes long and uncertain delays, and it is unacceptable to most global buyers. They also mentioned that challenges that face logistics operations have become a great concern at this time since they result in poor performances of logistics.

2.5.1. Logistics Challenges in different Countries

According to the study by Vietnam Ministry of Transport and the World Bank (2002) the major logistics constraints the Vietnam manufacturing industries faces are its dependence on imported inputs, its difficulty in establishing direct relationship with buyers, taxes and the restrictions placed on foreign owned companies. Related to this, insufficient container handling capacity, insufficient road development and maintenance, underused railways capacity, insufficient management, insufficient airfreight facility are the major problems in logistics infrastructures (Ministry of Transport, Vietnam & The World Bank, 2002).

Similarly, Goh and Pinaikul (2002) studied the factors hindering logistics development in Thailand and found that inefficient logistics information systems, acute transportation bottlenecks, climate changes, lack of modern logistics management techniques and expertise, high cost of acquiring and installing automated logistics equipment, and the current inefficiency of the logistics information systems.

According to Edward (2004) the main logistics and supply chain management barriers in Europe are built inefficiencies in supply chain, ineffective communication structures, poor exchange of information, inappropriate culture, excessive reliance on forecasting and stockholding, managing problems rather than eliminating their causes.

Donald and David (1997) explored that the major logistics challenges facing Brazilian logisticians is inability to access and apply the growing logistics knowledge base and the wide variance in customer sophistication.

Clifford (2011) also mentioned the top ten logistics challenges as: infrastructure, the price of diesel, rising truck rates, capacity, the economy, ocean shipping, security, the green movement, the election and increased truck weight limits.

On the other hand, Alan and Remkovan (2008) described that extended lead time of supply and extended and unreliable transit time are the main logistics challenges.

A study by Thomas (2009) reported in the fifth state of logistics survey that the increasing logistics cost in South Africa continue to be constraints and challenges to expand market into international trade.

Even the industry in China grows year of year, there were some major logistics challenges that interrupt the development like rising cost, financing bottlenecks, in-house mind-sets to handle logistics, localized services, lack of unified top level institutional coordination and imbalance transport infrastructure development (Li & Fung Research Centre, 2008).

Other challenges in China as reported by Armstrong and Associates (2004) were poor infrastructure, regulation, bureaucracy and culture, poor training, ICT, undeveloped domestic industry, high transport costs, climate changes, poor warehousing and storage, regional imbalance and domestic trade barriers.

On the other hand, David, Robin, Robert and Louis (2007) in their study argues that uncertainty and variability, human behaviour, limitations of current information systems, data overload and bad data, product proliferation and shortening life cycles and misaligned decisions and performance measures are the major logistics problems for many manufacturing logistics sectors.

A study by Neil (2011) to identify the logistics challenges and present solutions for Sydney, Australia especially on the transportation sector explored that logistics challenges of Australia are grouped in to six: they were logistics challenges related to geography (traffic congestion, road changes, higher distances, geographical location of some places), demography (ageing population and growing concentration of population), environment (climate changes, green logistics, seasonal problems, natural disasters like cyclones and floods), legislation(transport regulations and funding disagreements) and technology (costly new technology, lack of integrated system, resistance to change, dependency on technology) as well as other challenges(rising fuel prices, security issues, delay due to maintenance of roads).

In response to the identified challenges he gave potential solutions like increased driver training, better forecasting and planning, improving transport networks and infrastructure.

A well-developed transport and communication infrastructure, a sound governmental industrial policy and a well-developed educational system are the necessary conditions for improved logistics and manufacturing. Until recently, African firms did not have this autonomy because of the heavy involvement by the government. As a result, bureaucratic procedures inside and outside the firm impeded the flexibility of the firm (Biersteker, 1992; Mkandawire, 1994 as cited in Hans, 1999).

2.5.2. Logistics Challenges in Ethiopia

Since Ethiopia is locked country, the only means of logistics activity depend on port Djibouti and currently the government try to negotiate to use Somali land and Mombasa ports as an option. Also, according to Tilahun (2014), in Ethiopia, problems in the maritime transport sector have become one of bottlenecks to international trade.

Similarly, Fasika, Klaus and Marcus (2014) in their research on the 12 types of industries found that long delays in customs and port handling as well as complex tariff for imported items are becoming the challenge for logistics and supply chain processes. They also found that the major supply challenges are inconsistency of quality raw material during bidding time and final delivery, unavailability of local suppliers for imported items and long processing and delivery time due to lengthy bureaucratic procedure involved in the purchase of the imported raw material. Their study also indicated that the major transportation challenges are Ethiopia having no access to sea (Land-locked country) and back ward transport infrastructure. Due to this the deliver process was expensive and challenging. This hinders the firms' competitiveness of the country.

Girum and Florian (2013) in their study indicated that the recently introduced 'Export Trade Duty Incentive Schemes Proclamation No 768/2012' has several instruments to minimize the problems of inventory stocking and lead time for establishments that import inputs, such as chemicals, for the production of commodities for the export market.

They found that bonded input supplies warehouse scheme is one of such instruments whereby exporters are allowed to store inputs without duty payments under the supervision of the customs authority. It is also indicated that this scheme reduces customs clearing time, overstocking of raw material inventory and lead time.

The above challenges that are found by different researchers are highly focused on transportation and supply side issues.

This study is not limited in its scope and tried to identify the general logistics challenges using different categories like environmental, technological, legislative, and it presented the critical ones that need immediate action.

Ethiopia is under developing country and looking different manufacturing and related technique from developed countries. Port is the other issue for fast logistics activity. As a landlocked country, Ethiopia primarily uses the port of Djibouti as a gateway for the vast majority of its internationally traded goods with most of the goods essentially transported to and from the port by trucks. This situation has made Ethiopia's trade logistics very expensive and uncompetitive.

The other logistics challenges faced due to geographical and demographical condition of the country. The topographic barriers throughout the country makes the road transportation activity very slow and ineffective.

2.6 Environmental concerns in plastic recycling process

The Ethiopian constitution has clearly stated people's right to live in a convenient, healthy environment and to use environmental resources effectively. The issue is also incorporated in various policies and principles of the nation.

There are many different types of plastic, and they cannot all be recycled together. So unless you're diligent about sorting all your plastics, then "recycling" that yogurt container may be doing more harm than simply throwing it away.

Recycling is generally far better than sending waste to landfills and relying on new raw materials to drive the consumer economy. The chief problem lies in plastic's complexity: There are as many types of plastic as there are uses. And since each type can only be recycled with its own kind, plastics need to be carefully sorted before they can be processed. The presence of enough foreign materials—from food to dissimilar kinds of plastic—can ruin an entire batch of would-be recyclables.

Plastics are chemically categorized by numbers, which are displayed inside the chasing-arrow icon on many plastic containers. The two most common types are plastic #1 (polyethylene terephthalate, or PETE), which is used mainly in soda and water bottles, and #2 (high-density polyethylene, or HDPE), used in things like detergent bottles and milk jugs. Unfortunately, while plastics marked #1 or #2 are generally considered to be recyclable, not all containers with those numbers actually are.

The reason for this is that many plastics contain additives blended into the original resin, and the different additives create discrepancies even within each category. Every container in the grocery store is made with a unique blend of chemicals—plasticizers, moulding agents, dyes—that combine to give a plastic its shape, colour, strength, and flexibility (or lack thereof). As a result, they melt at varying temperatures and respond differently to new additives, and so they cannot all be melted down and recycled together to make a new product.

2.7 Conceptual framework

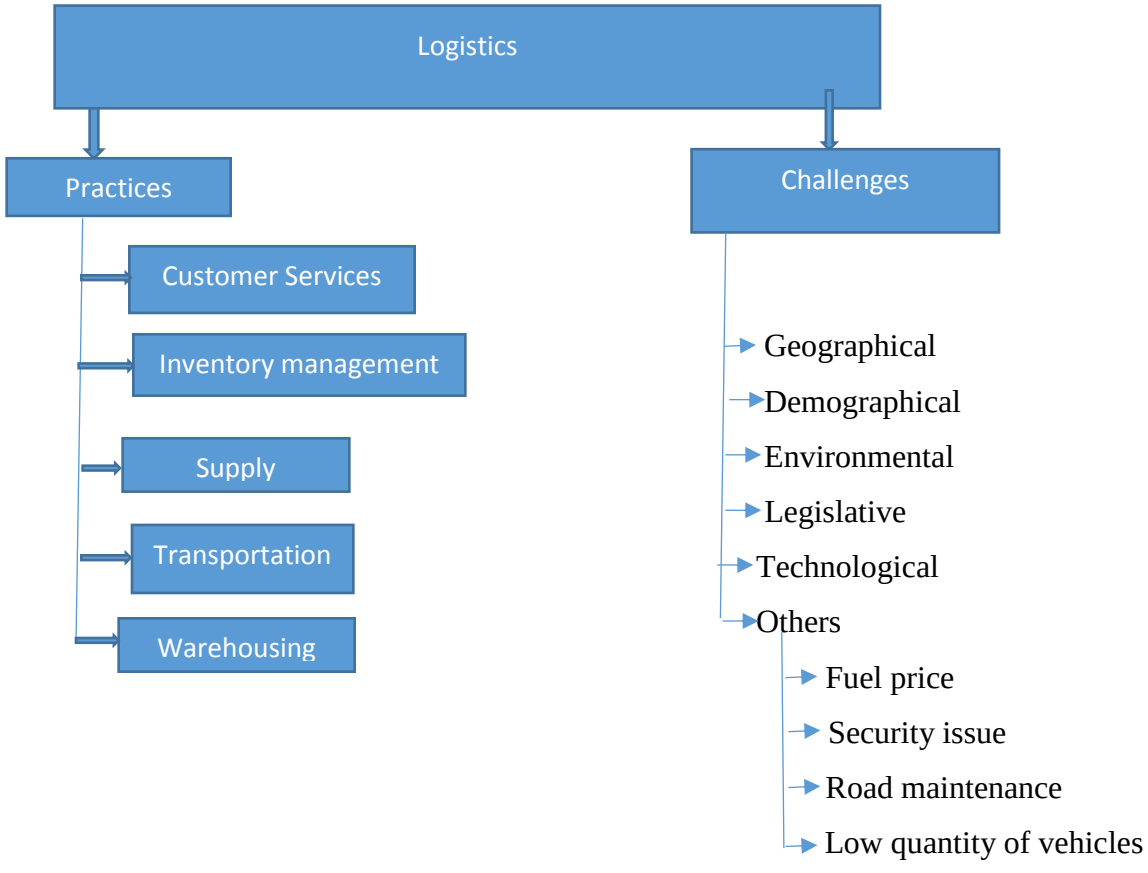

Figure 0-1. ***Conceptual frame work of the study: adapted from Frazelle (2002) and Neil (2011).***

As indicated in the diagram of the conceptual frame work, the study is highly focused on the extent of practices of the above five main logistics activities and the challenges of logistics using the six categories.

CHAPTER THREE

METHODOLOGY

This chapter presents the methodological approach applied in this thesis and gave insight into the data collection methods and the main sources of information.

3.1 Description of the study area

The study focused on the logistics practises of Ethiopian plastic recycling companies. The core companies' activities from getting of used plastic as raw material, processing, warehousing and finally distribution to the customers were included in the study area.

3.2 Research Approach

A combination of qualitative and quantitative method is often the best way of handling research questions through triangulation (Russel, 2005 cited in Ahmed, 2005). Hence, endeavours were made to utilize the advantages of each method. Thus, the study used qualitative as well as quantitative research approach to explore the logistics practice in Ethiopian plastic recycling companies. It involved qualitative and quantitative researches that tends to be inductive which means that developing a theory or look for a pattern of meaning on the basis of the data collected.

3.3 Research Design

Since the main objective of the study is to describe logistics practices of Ethiopian plastic recycling companies and the related logistics challenges, the proposed study employed a **descriptive type** of research design. Descriptive research studies are those studies which are concerned with describing the characteristics of a particular individual, or of a group. Studies concerned with specific predictions, with narration of facts and characteristics concerning individual, group or situation are all examples of descriptive research studies (Kothari, 2004, p37). So the study combined both qualitative and quantitative research approaches, and this is considered to be efficient for answering the research questions.

3.4 Population and Sample

The target population for the study is all the 17 medium and large plastic recycling companies found in Ethiopia. According to Chemical & construction Inputs Industry development Institute, there are 17 registered companies who work on plastic recycling process. Two are located in SNNPR Hawassa, one in Diredawa and the rest are in Addis Ababa and Oromia special zones. Since the total population is small in number, the study does cover all the total population of the study and sampling technique is not applied. However, the respondents that

represent the company are selected using expert purposive sampling who work on logistics and related areas and have glean knowledge in particular expertise in logistics activity. These can handle by managers or supervisors working in department that practices the logistics activities. These are marketing, production and purchasing. Only 3 companies who don't have those department and the activity can be done by General Managers and supervisors. Those working as a heads and supervisors for the above three companies are selected since they are well aware of the logistics practices and easily observed the related challenges. Therefore, 14 companies are represented by three respondents and the rest three by 2 respondents who are selected purposefully with the total respondent of 48.

3.5 Data source and type

The study will use both primary and secondary data collection methods to achieve its objective. For a primary data collection method, structured questions will apply. In addition, secondary data will collect from documents and performance which recorded by the companies and from Ethiopian Ministry of Industry, Addis Ababa investment office and Chemical & Construction inputs industry development institute data archival.

3.6 Data collection Procedure

Data collection procedure will have questionnaires that properly address the acquired information in order to get back the required data. Before proceed to data collection, the questionnaires will be design as per required approach in order to easily understand by the respondents.

The designed questioners will be distributed to respondents and followed by collection of filled data. After collection of the data, analysis will done.

3.7 Ethical Consideration

The information collected from companies is going to be kept confidentially in order to keep their ethical value. Institutional secured data like financial statements are not required for the analysis, and this in turn encouraged the firm representatives to freely respond for the items under study.

3.8 Measurement and Instrumentation

The five point Likert scale is found to be the appropriate measurement for rating the logistics practices and also helps to easily describe the data output using mean and standard deviation. For the case of logistics challenges, the responses will rate by frequency and percentage.

For the purpose of performing statistical analysis on the questionnaire, the responding firms will request to rate some statements related to logistics practices. The questionnaire consisted of scaled

response from 1 to 5, such that 1 = never practiced, 2= poorly practiced, 3= moderately practiced, 4=well practiced, and 5=extensively practiced.

In the case of logistics challenges, six different categories were prepared and expected responses were collected from respondents. In order to get accurate information, this questionnaire consisted on scaled response from 1 to 5, such that 1 = never faced, 2 = poorly faced, 3 = moderately faced, 4 = well faced, and 5 = extensively faced.

Since there is no standard questionnaire is found that will rate all the selected logistics practices and challenges, the questionnaire was prepared by referring different related studies, and to increase validity of the instrument, the questionnaire pre tested on some of the respondents that have adequate knowledge on the subject. Using the expert views and suggestions, the final questionnaire was prepared and distributed to 48 respondents. Out of 17 companies, two companies were not responded and the rest 15 were filled and returned the questionnaire.

To check item reliability Cronbach's alpha coefficient was calculated to all items arranged in a five point Likert scale based on the responses of 42 questionnaires collected from 15 companies.

Table 1: Cronbach's alpha

Dimensions of Logistics practice	**No of items**	**Cronbach's alpha result**
Customer service practices	8	0.974
Inventory management practices	7	0.978
Supply practices	7	0.982
Transportation practices	5	0.978
Warehouse practice	7	0.982
Geographical challenges	6	0.976
Demographical Challenges	3	0.957
Environmental challenges	3	0.964
Legislative challenges	6	0.982
Technological challenges	6	0.984
Other challenges	4	0.970

3.9 Data Analysis

The study collected both qualitative and quantitative data and the data were analysed according to its type. After collecting the required data through the data collection tools, data processed to the following stages; the raw facts/ data made ready for data analysis. The collected data were edited first through field and office editing; and the edited data coded. Data gathered from participants were analysed by classifying as quantitative and qualitative approaches. Data collected in the quantitative approach were analysed using percentages (%), frequencies and SPSS (statistical package program for social sciences) to process the data and look at the effectiveness and logistics practice in plastic recycling companies and for qualitative data document analysis done and use it to provide explanations, understanding and interpretation of the companies.

Generally, data presentation and interpretation applied tables, charts and figures in order to display the collected data in a concise and meaningful way. The data were finally interpreted based on statistical findings.

CHAPTER -FOUR

DATA PRESENTATION, ANALYSIS AND DISCUSSION

4.1. Introduction

The data obtained from the primary source using structured questionnaires and secondary data are presented. The 48 questionnaire were distributed to the 17 plastic recycling companies. Except three companies, each getting 3 questionnaires and from this, 15 firms have completed and returned the questionnaire, while 2 firms did not complete the questionnaires, explicitly 42 out of 48 questionnaires are collected. This indicated that the response rate was 87.5 %.

Therefore, the response rate found is very good for further analysis of the data. Generally, findings of the study were presented to answer the leading research questions, and the marketing and production departments were the main sources of data.

4.2 Basic Information of the Firms under study and respondent Individuals

4.2.1 Basic Profile of Participant Firms

Among the 17 firms 12 of them are Foreign investors owned Plastic recycling companies and the rest are domestically owned firms which are; ET plastic factory, Tewodros Fikru plastic processing factory, Zaworat trading, ETH plastic and Tula plastic factory. These local investor/ domestically owned firms cover 29.41% and foreign investors owned plastic recycling companies covers 70.59%. Two companies located in Hawassa, one in Diredawa and the rest found in Addis Ababa and round of Addis (Oromia special zone).

The size of the companies varied greatly, from 58 to 300 employees, with daily production capacity of 3 to 8 ton of recycled plastics.

4.2.2. Profiles of Respondent Individuals Representing the Firms

The demographic statistics of the respondents' profile are shown in Table 2. For each of plastic recycling companies involved in this study, except three factories (in which only two representatives are participated), three representatives were participated to answer the distributed questionnaire.

Among the 42 respondents, 52.4 % hold bachelor degree in the academic qualification, 19 % hold a master's degree and 28.6% are Level 4 holders. The result shows that most of respondents furthered their study at higher level. Most of the respondents (99.3%) involved in this study were

managers and followed by the supervisors (6.7%). In general, the senior positions were actively involved in this study.

In terms of experience in the sector, more than half of the total organization (71.4%) had experience in the sector from 5 to10 years, 23.8% of the respondents worked for less than 5 years. Whereas 4.8 % of the respondent worked for 11 to 15 years.

All of the respondents either have direct or indirect involvement in logistics practices including distribution and warehousing activities. Therefore, majority of respondents are seen as experienced enough and sufficiently knowledgeable about the logistics practice in their firm.

Table 2. Profile of respondents

S/N	Characteristics	Frequency	Percentage
1	**Current position/Title**		
	Managers (GM, production, marketing and purchasing)	3, 15, 7, and 14 respectively	93.3
	Supervisors	3	6.7
2	**Experience in the firm**		
	Less than 5 years	10	23.8
	5 – 10 years	30	71.4
	11 – 15 years	2	4.8
	More than 15 years		
3	**Age**		
	Under 25	3	7.1
	25 - 30	11	26.2
	31 - 35	15	35.7
	36 - 40	7	16.7
	Above 40	6	14.3
4	**Sex**		
	Male	36	85.7
	Female	6	14.3
5	**Education level**		
	Level 4	12	28.6
	BSc/BA	22	52.4
	MSc/MA	8	19

4.3. Logistics practices of Plastic Recycling companies

Among 42 responses of the distributed questionnaires, only 3 representative respondents i.e. only one firm indicated that they have a customer service policy. Based on the reply, it is observed that the most common answer was that the company did not have any customer service policy.

Concerning the logistics department three factories mentioned that they have a logistics department in the organizational division and measures its logistics performance using quality, time, cost and delivery.

Other respondent firms do not have a logistics department, and do not apply a Logistics Information System/LIS. Instead they communicate mostly via email and telephone with their suppliers and customers. This indicates that most of the companies are not having an organized logistics department in their organization. This does not mean that they are not practicing logistics activities for their day to day operations. These companies mentioned that they are practicing logistics activities in marketing, production and purchasing departments.

The research questionnaire designed using 5 point Likert scale to collect appropriate responses, in relation to this the respondents indicated the extent they agree with the statements by choosing: 5-Extensively practiced, 4- Well practiced, 3-Moderately practiced, 2-Poorly practiced and 1-Never practiced. Based on the response of the respondents Mean computed on below tables from Table 3 to 8. A mean (M) score of 0-1.5 means that the respondents never practiced, between 1.50 to 2.50 means they poorly practiced, 2.50 to 3.50 means the respondents were moderately practiced, 3.50-4.50 means they well practiced and a mean above 4.50 means the respondents extensively practiced.

4.3.1. Customer Service

Table 3: Customer service practices

Customer service practices	Mean	Std. deviation
We respond quickly to the customer's needs	2.83	1.102
We fulfil customer orders in the promised date	2.33	1.119
We using up to date information for forecasting customers 'needs	2.21	0.782
We properly organized Invoicing and collection methods	4.1	1.008
We collect customer feedback to enhance customer satisfaction	4.14	0.843
We developed long-term relationships with our customers	2.81	1.018
We measure and evaluate customer satisfaction levels	3.71	0.864
We are properly manage our customers complaint	3.26	0.857

Table 3 illustrates the distribution of customer service practices mean scores and standard deviation.

Among all of the customer service activities, collection of customer feedback to enhance customer satisfaction is found to be the leading practice, with mean score 4.14 which indicates that it is well practiced.

Other customer service practices that have been also well practiced are: proper organizing of Invoicing and collection methods (4.1) and measure and evaluate customer satisfaction level (3.71).

The least practiced customer service practice is using up to date information for forecasting customers' needs (2.21). This finding revealed that most of the firms are poorly in a position to meet using up to date information for forecasting customers 'needs. The document found from seven companies indicated that due to inability to fulfil the ordered quantity of recycled plastics on time, their foreign customers who give order frequently has reducing their relationship with them. Due to this, firms are highly forced to concentrate on the local market.

Even if the respondents rate the measurement of customer satisfaction level at a well-practiced level, there was no adequate document found that indicates the firms are measuring their customer's satisfaction level.

Among the customer service practices the four highest values of standard deviation were observed for items of fulfil customer orders in the promised date (1.12), respond quickly to the customer's

needs (1.10), and developed long-term relationships with our customers (1.02) of which showed high inconsistencies among respondent firm responses than other items.

This signifies that for the above items, there is a higher difference in the level of practice by the companies; specifically, some firms perform them highly, whereas others to a small extent.

In contrast, the lowest standard deviation was using up to date information for forecasting customers 'needs (0.78) which indicates that there is low variation on responses for this item.

Generally, customer service activities like; collection of customer feedback to enhance customer satisfaction (4.14), proper organizing of Invoicing and collection methods (4.1) and measure and evaluate customer satisfaction level (3.71) well practiced and the rest customer activities are poorly practiced by Ethiopian plastic recycling companies

4.3.2. Inventory management

Inventory management practices were also assessed. The table presented below shows the results of the questionnaire on the inventory management practices in the respondent firms.

Table 4: Inventory management practices

Inventory management practices	Mean	Std. deviation
We easily identify all materials in the stock and have full inventory information	4.14	0.899
We apply lowest inventory driven cost	3.48	1.131
We have well-developed replenishment planning	2.07	0.921
We have well-developed inventory deployment	2.93	1.351
We can ensure the stock levels within the established maximum stock levels and emergency order point	1.95	0.987
We build collaborative arrangement with customers and suppliers for inventory management	2.52	1.174
We developed system for wastage free utilization of materials	3.48	1.194

It is seen that from all of the inventory management activities, easily identify all materials in the stock and have full inventory information is found to be well practiced with mean score of 4.14.

However, ensure the stock levels within the established maximum stock levels and emergency order point and well-developed replenishment planning 1.95 and 2.07 respectively.

The documents found in fourteen of the firms signified that, most of the firms followed a traditional inventory forecasting procedure which is dominantly based on previous two-three years' sales historical data.

The existing inventory planning systems of these firms correspond to establishing maximum stock levels especially for raw material inputs from foreign companies' supplies due to high uncertainties to the companies' basic operation.

Comparing individual items in the constructs, there were some differences among respondent's answer. The higher standard deviation values indicate that still there is a higher variation on responses given for all items in the inventory management practices.

For instance, have well-developed inventory deployment (1.35), developed system for wastage free utilization of materials (1.19), apply lowest inventory driven cost (1.13), and build collaborative arrangement with customers and suppliers for inventory management (1.17) shows the highest variation. This also indicates that for the above items, there is a higher difference in practice level by the companies; specifically, some firms perform them highly, whereas others to a lower extent. In contrast easily identify all materials in the stock and have full inventory information (0.90) indicates a lower variation in responses among respondents.

In general, inventory management activities are practiced at a lower level, except easily identify all materials in the stock and have full inventory information (4.14), by Ethiopian plastic recycling companies.

4.3.3. Supply

The supply practices of the firms are presented as follows.

68 percent of the responding companies indicated that the first criteria for selecting their suppliers is by availability of raw material and price of product or services is selected by 21 percent of the responding firms as the first criteria for supplier selection.

The finding indicated that the emphasis given for the purchase of the right quality raw materials is lower as compared to price of the raw materials by these firms. This shows also that are most of the firms are price sensitive.

92 percent of the firms showed that supplier responsiveness is the last criteria for selection of their suppliers. From this it can be understood that most of the firms are not worrying about the responsiveness of their suppliers.

Table 5: Supply practices

Supply practices	Mean	Std. deviation
We send and receive electronic communication with your suppliers	3.36	0.932
We effectively process purchase orders	3.55	1.087
Transparent information sharing about each other's inventory status with your suppliers	2.76	0.932
Collaborating with your supplier's development program(s)	2.74	0.912
Creating long-term relationships with your suppliers	3.55	0.968
We frequently evaluate our suppliers performance	2.60	0.989
We reward our suppliers as per their performance	3.02	0.924

In the supply practice the analysis shows that effective implementation of purchase order processing and creating long-term relationships with your suppliers (3.55) respectively, sending and receiving of electronic communication between firms and suppliers (3.36) and creating long term relationship with the suppliers (3.55) are well practiced. Whereas, frequent measurement and analysis of suppliers' performance (2.6) performed to a lesser extent.

The higher standard deviation values for all items indicate that still there is a higher variation on responses given for supply practices, and the level of practice in each firm is highly different.

Generally, the analysis signifies that there is a moderate level of long term relationship between suppliers and plastic recycling companies. This also reveals that companies didn't maintain strong linkage with suppliers, and more efforts shall be made for sustainability of their relationship.

4.3.4. Transportation

The transportation practices of the firms and the transport companies that work with them are presented below.

Regarding the transportation of recycled product to local customers and their retail shops, 9 of recycling companies used their own Trucks. But for the case of transporting accessories and components, and exporting the recycled plastics to foreign customers, all of them used the service of freight forwarders. This shows that they outsource the transportation activity to the freight forwarders or transporters.

Table 6: Transportation practices

Transportation practices	Mean	Std. deviation
We transport recycled plastics to our local customers in with in a good condition	2.52	1.194
We receive raw materials in our warehouse with in the required time	3	0.963
We have collaborative relationships with transport providing companies	2.5	0.969
We are using third-party logistics	2.05	0.962
We measure our transportation performance for local deliveries	2.17	1.057

On the area of transportation practices, the result shows that receive raw materials in our warehouse with in the required time (3.00) is moderately practiced.

Measuring the transport performance for local deliveries (2.17) and strategic use of third-party logistics (2.05) is poorly practiced. Other figures show that the results were above 2 and which signifies that these companies are in progress stage towards to moderate activity. Among the items under this variable, the two higher standard deviations were observed for transport recycled plastics to our local customers in with in a good condition (1.19) and measure our transportation performance for local deliveries (1.05).

In general, except from receiving of raw materials in their warehouse with in the required time (3) which moderately practiced, the rest transportation activities are poorly practiced by the companies and their transporters.

4.3.5. Warehousing

Finally, the warehousing activates of the firms are presented as follows.

Concerning warehousing 80 percent of firms i.e. 12 of them used private warehouses and the rest 3 used public warehouses for storage recycled plastic which is ready for customer.

Regarding material handling equipment usage 86.7 percent of companies' explicitly 13 of them used conveyors, carts and forklifts, the rest explicitly 2 of them used only carts.

Table 7: Warehousing practices

Warehousing practices	Mean	Std. deviation
We store products according to recommended storage guidelines	3.24	0.906
We properly optimize our storage space	3.48	1.131
We apply warehouse management system software for stock control	1.81	0.969
We accurately identify all storage locations	3.07	0.973
We apply Radio Frequency Identification to identify items	1.90	0.958
Our warehouse records and reports are up to date	3.02	0.950
We are using Waist-level handling and lifting aids	1.93	0.997

The warehousing practices are assessed and the analysis indicates that Warehouse Management System software for stock control (1.81), and the related Radio Frequency Identification tool (1.90) are almost in poorly applied stage by these companies. However, the above advanced ICT tools are not available in any of plastic recycling companies.

Storage space optimization (3.48), store products according to recommended storage guidelines (3.24), warehouse records and reports are up to date (3.02) and accurate identification of all storage locations (3.07) are moderately practiced by these firms.

The high standard deviation values also show that there is an inconsistency in responses of respondents.

Generally, warehousing activities are moderately practiced by Ethiopian plastic recycling companies, except the application of advanced ICT tools which is almost not applied by these firms.

4.4. Challenges of Logistics for plastic recycling companies

The respondents are asked to select what they believe is a logistics challenge, that are collected from different literatures, for their firm during their logistics operations, and mean and standard deviation of each category of logistics challenges are calculated and presented as follows.

Table 8: Challenges of logistics

S.N	Types of challenges of logistics	Specific Logistics Challenges	Mean	Std. deviation
1	Geographical challenges	We faced Traffic congestion during transport service	3.05	1.035
		We faced insufficient road development and maintenance	3.86	0.977
		We are with in long distance from customers	2.81	0.994
		We are with in long distance from suppliers	3.38	0.882
		Our customers are located in different geographical area	2.60	1.191
		Working peoples age affect our logistics activity	2.21	1.240
2	Demographical challenges	Dense population growth affect our recycling activity	3.07	1.045
		We faced irresistible human behaviour	3.55	0.889
		We faced people resistances to change	3.48	1.153
3	Environmental challenges	Climate change affect our logistics activity	3.02	1.316
		We faced perception shortage towards Green logistics	3.76	0.932
		Natural disaster affect our logistics activity	2.26	1.231
4	Legislative challenges	We faced lengthy bureaucratic procedures	3.21	1.025
		We faced funding disagreement by government	3.55	1.152
		We faced high taxes which settled by government	3.95	0.936
		We faced restriction on imported items	3.07	1.135
		We faced foreign currency shortage	4.02	0.841
		We faced low efficiency of customs activity	3.26	1.127
5	Technological challenges	High cost of new technologies that we can't afford to buy	3.00	1.059
		There is an inability to access and apply the growing logistics knowledge base	3.07	1.068
		We faced shortage on modern management techniques	3.45	0.993
		We faced insufficient logistics management capacity	3.31	1.070
		We faced poor exchange of information	3.31	1.137
		We faced shortage on integrated system	2.55	1.041
6	Other challenges	We faced shortage on fuel price	2.83	1.188
		We faced security issue like terrorism	2.55	1.347
		We faced delivery delay due to road maintenance	3.31	1.024
		We faced low quantity of vehicles	3.67	0.928

4.4.1. Geographical Challenges of Logistics

From the geographical challenges of logistics insufficient road development and maintenance (3.86) is a well faced challenge by plastic recycling companies. Whereas working people's age

affect our logistics activity (2.21) which is poorly faced challenge that is not critical challenge for the companies.

Among the challenges under geographical condition, the two higher standard deviations were observed for customers which located in different geographical area (1.19) and Working people's age affect logistics activity (1.24). In general, Geographical challenges are well faced by plastic recycling companies.

4.4.2. Demographical Challenges of Logistics

From the demographical challenges of logistics, irresistible human behaviour (3.55) and people resistances to change (3.48) are well faced challenges by the companies. This reveals that there is high resistance for changes, like using modern technology for practicing logistics activities efficiently by the stake holders. Ageing of population is the least challenge in this category.

4.4.3. Environmental Challenges of Logistics

The analysis made indicates that from the environmental challenges perception shortage towards Green logistics (3.76) is found to be the critical one that well faced by the companies. Which indicate that no awareness created towards Green Logistics activity.

Natural disasters which affect logistics activity (2.26) which is poorly faced by the companies. This shows that this is not a critical challenge under this category.

4.4.4. Legislative Challenges of Logistics

The analysis indicates that foreign currency shortage (4.02) and high taxes which settled by government (3.95) is found to be the most critical challenge which well faced by the companies. Under this category most of the challenges are well faced by plastic recycling companies.

4.4.5. Technological Challenges of Logistics

The finding shows that from the technological challenges of logistics insufficient logistics management capacity (3.31), modern management techniques (3.45), and poor exchange of information (3.31) are challenge which moderately faced by the companies.

However, shortage on integrated system (2.21) is not critical for them under this category.

In general, the challenges under this category are selected by most of the respondents next to legislative challenges. This shows that most of the challenges of logistics for the firms are found under the category of legislative and technological.

4.4.6. Other Challenges of Logistics

From this category low quantity of vehicles (3.67) is the most critical challenge that well faced by the companies. Most of these challenges under this category are external challenges that are

difficult to control. Even if different studies found terrorism as one of the critical challenges of logistics, only 13 respondents chose this challenge.

In general, the finding shows that from the geographical challenges of logistics insufficient road development and maintenance, irresistible human behaviour from demographical challenges, perception shortage towards Green logistics from environmental challenges, foreign currency shortage from legislative challenges, insufficient logistics management capacity from technological challenges, and low quantity of vehicles from other logistics challenges are the most critical challenges of logistics that well faced in their category.

In addition to the listed logistics challenges perception shortage towards Green logistics, high taxes which settled by government, and poor exchange of information are also quoted by respondents as challenges of logistics.

Generally, foreign currency shortage (4.02), high taxes which settled by government (3.97), insufficient road development and maintenance (3.95) and perception shortage towards Green logistics (3.76) are the critical logistics challenges which well faced by plastic recycling companies. This indicates that most of the logistics challenges are highly concentrated around custom offices, and are more of legislative issues.

This also signifies that most of the challenges of logistics are beyond the control of the firms, and need coordination between all the stakeholders for reducing the impact of these challenges.

4.5. Environmental concerns of plastic recycling activity

In order to identify what are the environmental concern of plastic recycling activity, the researcher conducted interview for 5 experts who support and closely work with plastic recycling companies. These are organized from one is from Industry mister department of chemical & construction enterprise protection and follow-up division directorate, three from Chemical & Construction Input Industry Development Institution and one from Chemical & Construction environmental protection section.

Out of 5 interviewed, one is female and the rest 4 were males. According to educational preparation 3 were second degree holders and 2 are first degree holders. All are more than 5 years working experience in the sector. Age data indicated that all five interviewed experts were between 30-35 years old.

Interview with from Industry mister department of chemical & construction enterprise protection and follow-up division directorate

Q 1, and 2; what are the environmental concerns of plastic recycling? What is your feedback on environmental issues of plastic recycling companies?

> "*There are differently categorized environmental issues on plastic recycling activity. It will start from sorting of different plastics wastes. There is no developed sorting system of different plastic wastes which done through manual by simple labour. It will be difficult to replace sorting process since there is lack of fool proof technology. Other issues like different material recycling processes that include separation of the plastic waste and material recycling without separation of the plastic waste.*"

When interviewing Industry mister department of chemical & construction energy study directorate director, the researcher found that, there is only manual sorting of plastic wastes in Ethiopian plastic recycling companies.

Interview with three experts from Chemical & Construction Input Industry Development Institution plastic sector

Q 1, and 2; what are the environmental concerns of plastic recycling? What is your feedback on environmental issues of plastic recycling companies?

> **"***There is recycling of two different materials and sorting issue. Recycling companies do not have enough knowledge about plastic waste characters. Many plastics contain additives blended into the original resin, and the different additives create discrepancies even within each category As a result, they melt at varying temperatures and respond differently to new additives, and so they cannot all be melted down and recycled together to make a new product*."

When interviewing the experts, the researcher found that the recycling companies recycle two different materials which have different chemical properties. Also Sorting is environmental issue for plastic recycling companies.

Interview with environmental experts from Chemical & Construction Input Industry Development Institution environmental protection sector

Q 1, and 2; what are the environmental concerns of plastic recycling? What is your feedback on environmental issues of plastic recycling companies?

> *"Plastic wastes can be dumped in different places which affect the environment and difficult to collect for recycling. Non-recyclable plastic wastes (thermostat plastic, multilayer plastics, plastic recycled more than 2 times etc.) that can generates disposal problems. Most of plastic recycling companies don not have proper measuring equipment for plastic*

strength. Also they are trying to recycle non-recyclable plastics that will non-usable and crate disposal issue. ”

When interviewing the expert, the researcher observed that non- recycled plastics are tried to recycle by the companies and faced disposal problem.

CHAPTER-FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1. Summary of findings

According to the data analysis in the previous section, summary of the findings is presented as follows.

- The application of warehouse Management System software for stock control (1.81), the related Radio Frequency Identification to identify items (1.9), and using waist-level handling and lifting aids (1.93) are almost not practiced by the companies.
- Although some of the respondent firms rate the measurement of customer's satisfaction level and created a good relationship with them highly. But secondary documents show that there is almost no available concrete evidence found that show these firms measure and analyse their customer satisfaction level, that lead to loosing of customers since no feedback collected regarding on customer satisfaction level.
- Difficult to ensure the stock levels within the established maximum stock levels and emergency order point (1.95), frequent evaluate suppliers' performance (2.6), measuring the transport performance of local deliveries (2.17) and using third-party logistics (2.05) are also poorly practiced by the firms.
- Effective process on purchase order processing (3.55), sending and receiving of electronic communication between firms and suppliers (3.36), creation of long term relationship with the suppliers (3.55), receiving of raw materials in companies' ware house with in the required time (3.0), and proper optimization of storage space (3.48) are moderately practiced by plastic recycling companies.
- Foreign currency shortages (4.02), higher taxes (3.95), insufficient road development and maintenance (3.86), perception shortage towards Green logistics (3.76), and low quality of Vehicles (3.67) are the major challenges of logistics which faced by Ethiopian plastic recycling companies.

- Sorting of different plastic waste is the most environmental concern observed by Ethiopian plastic recycling companies as mentioned by all the interviewee. And also recycling companies also try to recycle non-recycling plastic wastes that leads to disposal problem.

5.2. Conclusion

This paper aims to describe the extent of logistics practices and challenges in plastic recycling companies. Based on the results of the study and the summary of findings the following conclusions are given.

- Plastic recycling companies are not practiced activities of modern technologies for their warehouse management system like Radio Frequency Identification to identify items, Software for stock control, and waist-level handling and lifting.
- It is observed by the study, the companies indicated that they measure their customer satisfaction level, but secondary documents show that there is almost no available concrete evidence found that show these firms measure and analyse their customer satisfaction level. This can be conclude that hiding of their fail towards customer handling affect their competitiveness.
- The result also indicated that some of the activities ensuring the stock levels within the established maximum stock levels and emergency order point, frequent evaluate suppliers' performance, measuring the transport performance of local deliveries, and using third-party logistics are not well developed by plastic recycling companies.
- The activities; effective process on purchase order processing, sending and receiving of electronic communication between firms and suppliers, creation of long term relationship with the suppliers, receiving of raw materials in companies' ware house with in the required time, and proper optimization of storage space are moderately practiced by the companies.
- Logistics activities are not effective due to, foreign currency shortages, higher taxes, insufficient road development and maintenance, perception shortage towards Green logistics, and low quality of Vehicles.
- The logistics activity of plastic recycling affected by environmental issues. According to the study; sorting of plastic wastes, knowledge gap towards plastic characters, recycling process of two different material that include separation of the plastic waste, material

recycling without separation of the plastic waste, and recycling of non-recycled plastics are the challenges which observed in plastic recycling companies.

5.3. Recommendations

The purpose of the thesis is to identify problems related with logistics activities of plastic recycling companies and to forward suggestions and recommendations which can help to solve the process problems and ensure effective logistics activity and to eliminate environmental issues which are related with the process. Based on the study results and conclusions drawn above, some recommendations are proposed as a means of alleviating the problems found.

- As per the collected data, most recycling companies own their warehouse for storing of raw and finished products. But its poor design and absent of advanced technology affect its operation. It should be better to design the warehouse in such a way that maximize the space utilization for future expansion plan, reduce accidents on employees, and use modern technology like Radio Frequency Identification to easily identify the required items and improve service for their customers.
- Even if the respondent try to pretend on measuring customer satisfaction level, the secondary data reviled that, companies are not measuring their customer satisfaction level. In order to have a good supply as well as customer integration, companies should familiarise measuring customer satisfaction level by continuous assessment that enhance their good relationship with them as well as can get feedback for corrective action.
- The study indicated that, companies are using transport providers for local and freight forwarders for exporting of recycled products. However, their performance highly affect logistics activity. In order to enhance the activity, the companies should work closely with transport companies by measuring their performance and giving recognition to enhance services that improve logistics activity. In addition to this, advice freight transport companies in order to apply modern technology like GPS for easily tracking of loads.
- Since companies are not well fit towards the plastic characters, it will be advisable that government should have given different supports like; adequate trainings regarding on different plastic characters, and informing about new technologies that will enhance plastic recycling activity. Additionally, short-term as well as long-term trainings and workshops on best logistics operations could be arranged by the Ministry of Industry so as to equip

managers and supervisors by the knowledge of different concepts of logistics and its applications.

- It is recommended to eliminate environmental issues like sorting of plastic wastes, recycling process of two different material that include separation of the plastic waste, material recycling without separation of the plastic waste, and recycling of non-recycled plastics by implementing serous follow-up the recycling process, labourers, and mounting modern technologies. Training is also recommended on how to manage environmental concerns. Generally, it would be better for all stakeholders to work with equal commitment and sense of urgency to strengthen the logistics performance of plastic recycling companies and to improve the competitiveness of this sector in the international market.

5.4. Suggestions for further study

For future research studying the logistics practices and challenges by expanding the scope i.e. by including the stakeholders of these firms like Ministry of Industry, transporters and customs office, etc. is recommended. Other logistics activities like sourcing, manufacturing, etc shall also be studied in detail.

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ADDIS ABABA UNIVERSITY

SCHOOL OF COMMERCE

DEPARTMENT OF LOGISTICS AND SUPPLY CHAIN MANAGEMENT

GRADUATE PROGRAM

QUESTIONNAIRE

Dear participants I am a MA student in Logistics and Supply Chain Management in Addis Ababa University School of Commerce and I am conducting a study on **Logistics Practices and Challenges of Ethiopian plastic recycling companies**. The objective of this project is to describe logistics practices and challenges in plastic recycling processes. Through your participation, I eventually hope to understand how logistics is practiced and the related challenges which support for further analysis and study.

Enclosed with this letter is a brief questionnaire that asks a variety of open and close ended questions about your experience toward logistics practices and challenges in your respected firm. I am asking you to look over the questionnaire and, if you choose to do so, please complete the questionnaire and call me on the phone number provided below, so that I will come and take it on any time that is convenient for you.

Please do not write your name on the questionnaire. Your responses will not be identified with you personally, nor will anyone be able to determine which company you work for. Nothing you say on the questionnaire will in any way influence your present or future employment with your company.

I hope you will take a few minutes to complete this questionnaire. Your participation is voluntary and there is no penalty if you do not participate.

If you have any questions or concerns about completing the questionnaire or about participating in this study, you may contact me at 0911250674/0911688193 or at yirgameskel23@gmail.com.

Thank you in advance for your cooperation!

I. Demography of Respondents

1. Current Position /title…….

2. Number of total work experience plastic recycling companies……

3. Age

a. Under 25 b. 25- 30 c. 30 - 35 d. 35 - 40 e. above 40

4. Sex

a. Male b. Female

5. Educational level

a. Level 3 b. level 4 c. BSc/BA d. MSc /MA e. PhD f. other ……..

II. Logistics Practices

1. Is there a formalized logistics department in the firm you are currently working?

a. Yes b. No

If not, in which department you exercise logistics practices? **.....**

2. Do you evaluate your logistics practices according to customer response? a. Yes b. No

If your answer is **yes,** what are the performance metrics used for measurement

……

3. Is there a Logistics Information System/LIS in your firm? a. Yes b. No

If your answer is **no,** which method of communication do you use for customers' communication? *You can mark more than one***.**

a. Calling b. mailing c. Faxing d. Posta

1. Customer Service

Do you develop and maintain customer service policy? a. Yes b. No

If your answer is **yes,** please state your customer service policy shortly

……

……

Please rate the following customer service practices in your company. Please tick;

1. Never practiced 3. Moderately practiced 5. Extensively practiced
2. Poorly practiced 4. Well practiced

Customer service practices	**Rating**				
	1	**2**	**3**	**4**	**5**
We respond quickly to the customer's needs					
We fulfil customer orders in the promised date					
We using up to date information for forecasting customers 'needs					
We properly organized Invoicing and collection methods					
We collect customer feedback to enhance customer satisfaction					
We developed long-term relationships with our customers					
We measure and evaluate customer satisfaction levels					
We are properly manage our customers complaint					

2. Inventory management

Please rate the following Inventory planning and management practices in your company.

Inventory management practices	**Rating**				
	1	**2**	**3**	**4**	**5**
We easily identify all materials in the stock and have full inventory information					
We apply lowest inventory driven cost					
We have well-developed replenishment planning					
We have well-developed inventory deployment					
We can ensure the stock levels within the established maximum stock levels and emergency order point					
We build collaborative arrangement with customers and suppliers for inventory management					
We developed system for wastage free utilization of materials					

3. Supply

What are your criteria for selecting your suppliers? Please *give them rank as firs, second, third, fourth and fifth.*

a. Availability of raw materials……

b. Quality of raw materials or service ……..

c. Reliability of delivery of service …….

d. Supplier flexibility……

e. Supplier responsiveness……

f. Price of products or service……

Please rate the following supply practices in your company.

Supply practices	**Rating**				
	1	2	3	4	5
We send and receive electronic communication with our suppliers					
We effectively process purchase orders					
Transparent information sharing about each other's inventory status with your suppliers					
Collaborating with your supplier's development program(s)					
Creating long-term relationships with your suppliers					
We frequently evaluate our suppliers performance					
We reward our suppliers as per their performance					

4. Transportation

4.1 How do you transport the recycled plastics to your local customers and your retail shops? a. Using your own fleet b. outsourcing c. renting

4.2 Does your firm outsource the transportation of recycled plastics to foreign customers? a. Yes b. no

Please rate the following transportation practices in your company and your freight forwarders.

Transportation practices	**Rating**				
	1	**2**	**3**	**4**	**5**
We transport recycled plastics to our local customers in with in a good condition					
We receive raw materials in our warehouse with in the required time					
We have collaborative relationships with transport providing companies					
We are using third-party logistics					
We measure our transportation performance for local deliveries					

5. Warehousing

5.1 Which type of warehouse you are currently using?

a. private b. public c. both public and private

5.2 Which type of material handling equipment you are using?

a. Conveyors b. Carts c. Cranes d. Forklifts e. Automatic Guided Vehicles

Please rate the following Warehousing practices in your company.

Warehousing practices	**Rating**				
	1	**2**	**3**	**4**	**5**
We store products according to recommended storage guidelines					
We properly optimize our storage space					
We apply warehouse management system software for stock control					
We accurately identify all storage locations					
We apply Radio Frequency Identification to identify items					
Our warehouse records and reports are up to date					
We are using Waist-level handling and lifting aids					

Logistics Challenges

Different literatures identified the following logistics challenges. Please **rate** the challenge that faces your firm from the following lists.

Please rate the following Logistics challenges in your company. Please tick;

1. Never faced 3. Moderately faced 5. Extensively faced
2. Poorly faced 4. Well faced

Logistics Challenges	**Rating**				
	1	2	3	4	5
We faced Traffic congestion during transport service					
We faced insufficient road development and maintenance					
We are with in long distance from customers					
We are with in long distance from suppliers					
Our customers are located in different geographical area					
Working peoples age affect our logistics activity					
Dense population growth affect our recycling activity					
We faced irresistible human behaviour					
We faced people resistances to change					
Climate change affect our logistics activity					
We faced perception shortage towards Green logistics					
Natural disaster affect our logistics activity					
We faced lengthy bureaucratic procedures					
We faced funding disagreement by government					
We faced high taxes which settled by government					
We faced restriction on imported items					
We faced foreign currency shortage					
We faced low efficiency of customs activity					
High cost of new technologies that we can't afford to buy					
There is an inability to access and apply the growing logistics knowledge base					
We faced shortage on modern management techniques					
We faced insufficient logistics management capacity					
We faced poor exchange of information					
We faced shortage on integrated system					
We faced shortage on fuel price					
We faced security issue like terrorism					
We faced delivery delay due to road maintenance					
We faced low quantity of vehicles					

If there are **Logistics Challenges** which you are facing and that are not mentioned, please list them on the space provided.

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