

Assessment of Logistics Practice in Project Context: The case of Ethio Telecom Expansion Project (TEP)

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Declaration

I, the undersigned, hereby declare that this thesis is my original and has not been presented for a degree program in this or any other university and all sources or materials used for the thesis are duly acknowledged.

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Acronym and Abbreviation

- AIDC: Auto ID Data Capture
- ERP: Enterprise Resource Planning
- ERCA: Ethiopian Revenue and Customs Authority
- ESLSE: Ethiopian Shipping and Logistics Service Enterprise
- IT: Information Technology
- ICC: International Chamber of Commerce
- LANs: Local Area Network
- LSCM: Logistics and supply chain management
- NCPDM: National Council of Physical Distribution Management
- RFID: Radio-frequency identification
- SCM: Supply chain management
- SPSS: Statistical Package for the Social Science
- TEP: Telecom Expansion Project
- WB: World Bank
- WMS: Warehouse Management System
- WCO: World Customs Organization,
- WTO: World Trade Organization

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Abstract

Most authors agree that project management is about achieving time, cost and quality targets, within the context of overall strategic and tactical client requirements, by using project resources. Some degree of risk always exists in the project, such as in technical, test, logistics, production, engineering, and other areas. With this in mind, this research aims to assess the logistics practice in project context, the case of Telecom Expansion Project (TEP). Based on ethio telecom's logistics responsibility and literature reviews, the study identified four logistic factors for the assessment. These includes: warehouse, transportation, customs clearance and integration. The researcher used survey questionnaire and open ended interview to collect data from respondents that have been part of the expansion project. To select respondents, both probability and non-probability sampling techniques have been used. The data analysis is conducted through descriptive, correlation and multiple regression statistical technique using Statistical Package for the Social Science software (SPSS). The analysis and findings show that the transportation management system of the company has resulted in inefficient logistics practice. Warehouses were also inefficient in space utilization and performance and productivity of the warehouses suffered as the operations were manually carried. To some level, special permit from statutory bodies/agencies, and high loading down time at the port of Djibouti have been identified as unreasonable source of clearance delays. Further the finding revealed that project performance can be predicted from logistics factors. Finally the study recommended that consideration of logistics factors needs early involvement in the project design phase. Furthermore, since the telecom projects are relatively big and spend a lot of money on logistics, smaller improvements can generate large savings.

Key Words: *Project Management, Logistics, Customs Clearance, Warehouse, Integration, Transportation.*

CHAPTER I

INTRODUCTION

1.1. Background of the study

Logistics is an important component of supply chain management (Stank, 2005). The Council of Supply Chain Management Professionals (2007) defines logistics management as “part of Supply Chain Management that plans, implements, and controls the efficient, effective forward and reverses flow and storage of goods, services and related information between the point of origin and the point of consumption in order to meet customers’ requirements.”

Scholars agreed that logistics play significant roles for operational as well as project activities. Nowadays, almost more than ever, everybody asks for “projects” to return the world economy to its former speed through effective use of each available scarce resource like money, people, and time (Passenheim, 2009). According to (Henrie, 2006), essential to project success is the timely, accurate, and cost effective delivery of materials, supplies, and equipment. In this regard, logistics key role for successful project performance by ensuring project resource arrive as required by delivering the right resource to the correct location at the required time (Henrie, et al., 2006).

Efficiency of logistics and supply chain operations can be source of distinct competitive advantage for an organization (Kampstra, 2006). As per Sahoo and Mishra (2013), the basic objective of supply chain management is to optimize performance of the chain to add as value as possible for the least cost possible. Chartered Institute of Logistics and Transport (UK) (2012) put the role of logistics as positioning of resources at the right time, at the right place at the right cost and at the right quality. For Alan (2014) Logistics is concerned with the efficient transfer of goods from the source of supply through the place of manufacture to the point of consumption in a cost-effective way while providing an acceptable service to the customer.

According to Janssen (2010) in logistics management, unwise decisions create multiple issues, failed or delayed deliveries lead to buyer dissatisfaction, damage of goods due to careless transportation is another potential issue, poor logistics planning gradually increases expenses and issues may arise from implementation of ineffective logistics system. The same author suggested

that to resolve these issues, organizations should implement best logistics management practices, companies should focus on collaboration rather than competition, good collaboration among transportation providers, buyers and vendors helps reduce expenses and also an efficient and safe transportation provider is vital to business success.

Regarding to the impact of logistics, Rodrigues (2005) identify logistics as one of the largest costs involved in international trade. Thomas and Kopczak (2005) stated that logistic activities comprise procurement, transportation, tracking and tracing, customs clearance and warehousing. Making logistics a critical and important factor, from a financial point of view, there is still a lot of room for cutting costs through operational efficiency and effectiveness.

Since logistics activities determine project performance in terms of cost through movement and procuring materials, project time through quick availability of resource and project quality through supply of standard products at right condition (Rajib and Mohammad, 2010), the researcher eager to assess logistics management practice of ethio telecom expansion project with the purpose of identifying the gaps or problems and propose alternative solutions on logistics practices.

1.2. Background of Ethio Telecom and Telecom Projects

Telecommunication service was introduced to Ethiopia in less than two decades of the invention of telephone. However, from introduction of the service in the country up to 1991, expansion of telecommunication services were not given much priority and thus penetration level and geographic coverage remained at low level.

As a continuation of the 2005/06-2009/10 five-year plan and after concentrating its efforts on education, health and agriculture, the Ethiopian government has decided to focus on the improvement of telecommunication services, considering them as a key lever in the development of Ethiopia. Ethio telecom is born, on Monday 29th November 2010, from this determination of supporting the steady growth of our country, within the Growth Transformation Plan (GTP), with ambitious objectives for 2015.

The company aims to provide next generation network services based on a world class standard information technology services and to build a competent next generation network based

workforce with appropriate knowledge, skill, attitude, and work culture. Since its establishment as ethio telecom, the company has registered several accomplishments required to transform the company to a level expected from a competent and modern telecom service providers.

So far, it has availed full range of coherent telecom Products and Services for all markets and segments, undertaken high level capacity building programs within very short period of time, tried to curb recurrent quality of service problems, and launched the first professional Call Centre in Ethiopia.

In the last 10 years remarkable advancements in infrastructure and service expansion have been made. In 2005 there was only 0.56 million mobile subscribers, 20,000 Internet service subscribers, and that of fixed line stood at 620,000 subscribers (Company Profile, 2013).

As part of continued effort to expand telecommunication infrastructure and service, a large scale IP-NGN project with a capital outlay of 1.5 Billion USD was launched in year 2008 and the project resulted in creating 23 Million Cellular mobile core network, and 2.4 Million fixed line capacity.

In 2010 the mobile service subscribers reached 6.5 Million, Internet 187,346 and fixed line 1 Million. With regard to enabling citizens to benefit from universal telecommunication service access the rural kebeles (villages) who have access to telecommunication service in 5 km radius increased from 13% in 2005 to 62.14% in 2010 (Company Profile, 2013).

The WoredaNet project, the e-government communication backbone developed by the government and the SchoolNetproject, are also the major enablers for rapid ICT development in the country. Another indicator is the completed rollout of more than 17,000 Km of fiber optics backbone across most of the country. The national fiber optic backbone is connecting all major and smaller towns.

After completion of the IP-NGN project, in year 2013, the government planned and executed a Telecom Expansion Project (TEP) with an investment amount of 1.6 Billion USD. The Telecom Expansion project was executed in the second half of the first 5 years Growth and Transformation Plan (GTP I). As of June 2015, the country has achieved high subscription levels by raising the number of mobile subscribers to 40 Million, and Internet users to 10 Million.

The TEP has resulted in Mobile service penetration of 44%, and Internet penetration has also reached 11%. The Country's 85% of geographic area has coverage of mobile service. If only habitable areas are considered, this can be taken as 100% coverage(ethio telecom Project report 2016).

The mobile network coverage comprises 3G and 2G services, and 4G LTE technology deployment in the capital Addis Ababa. The government has also been working towards improving its international internet gateway capacity/bandwidth through international fiber optic links via neighboring countries Djibouti, Kenya and Sudan. The current international bandwidth capacity stands at 27.3 Gbps.

Based on the expansion project logistics report, the logistics program has managed a huge volume of incoming and outgoing of shipments for the last three years. Regarding the inbound shipment, 36,803 packages were shipped by air with 1,150 consignments. On the other hand 745 shipments were sailed through 1,166 and 1,241 20ft and 40ft containers respectively(ethio telecom TEP report 2016).

Around 5 high sized warehouses were established to smoothen the flow of materials to 8 regions or telecom circles as project naming. During the rollout project phase, more than 6500 orders were handled to distribute towers, power and telecom equipment to more than 4500 sites.

Project management involves coordinating various aspects of a project in order to bring forth a positive result. This coordination includes elements such as personnel, materials, procedures and facilities. Over the past five to ten years, there have been increasing challenges faced by project managers, which are bound to be formidable. Some of the aspects of project management that are particularly challenging are quality, cost and schedule.

One the major external factor that can affect projects is the unavailability of materials. This material shortage can contribute to increasing project costs and schedule delays. Even if the workforce is complete as per the project plan, if the material is not there for them to work on, then productivity and schedule suffer. Mainly such materials shortage comes from inefficiency of the logistics structure and performance.

Analyzing and assessing logistics and supply chain practices will help discern important issues such as emerging trends and areas of concern (Srivastava, 2006), which will help in taking remedial measures. Thus, based on the real experience, this study assesses the logistics activities of telecom expansion project from logistics perspective and provide valuable finding for improving logistics performance so that ultimately enhancing the overall performance of the project.

1.3. Statement of the Problem

Project performance is highly dependent on effective and efficient management of resource, skills, technology and ideas to deliver business benefits or achieve business objectives. Good project management helps to ensure that these benefits or objectives are achieved within budget, time and to the required quality. Despite project performance dependency on a number of discipline and activities, logistics management is among the major project actions in the management of material flow from obtaining the raw components through the added value transformation process and delivering the final product (Henrique, 2007).

Project management is always about meeting the issues in the magic triangle: scope, time and cost. If one of the goals is missed or wrongly planned, the project's success usually can only be achieved by relocation of more resources, which costs money and/or will take more time. (Passenheim, 2009)

Most of Ethio telecom projects are not finalized within the given time line, cost and quality. As noted and reported in the company's project performance reports, shipment delays, unavailability of standard warehouse in desired locations, absence of access roads, shortage of trucks and materials handling equipment, poor packaging, invoice errors, delay of shipment documents are among the major logistics related problems that have an impact on project performance in one or another way (ethio telecom Project report 2015 and 2016).

Thus it is vital to examine the logistics practice and its effect on projects performance and hence take appropriate interventions for improving its purpose. Such information would help project sponsors and project managers to take appropriate interventions so as to achieve the company objective and balance the three parallel goals.

However, there is limited empirical evidence that can help to address this relevant issue to the best of the researcher's knowledge. Furthermore, there is no research conducted on telecom project implementation challenge in ethio telecom following project accomplishment. Hence, the shortcoming of empirical works that assess the logistics practice and its challenges on projects, specifically on telecom sector provides a rationale for new research contribution.

So the main purpose of this research is to assess the logistics management practices of ethio telecom in project context, identify the gaps and propose best practice of logistics management to solve the problems stated.

1.4. Research Questions

With the aim of identifying the gaps that may exist in the project logistics practice, the study tries to answer the following questions:

1. What looks like the logistics practice and performance of telecom expansion project?
2. How was the performance of the customs clearance and its challenges?
3. How was the performance of the warehouse and its related challenges?
4. How was the performance of the transportation and related challenges?
5. How was the logistics integration in project implementation?
6. At what level logistics factors affect project performance?

1.5. Objectives of the Study

1.5.1. General Objective

The main objective of the study is to assess the logistics practice of ethio telecom expansion project with the purpose of identifying the gaps or problems and propose alternative solutions on logistics practices.

1.5.2. Specific Objectives

In alignment with the main objective, this study tries to address the following specific objectives

- To assess the performance of the customs clearance activities and related challenges

- To assess the performance of the warehouse activities and its related challenges
- To assess the performance of transportation activities and related challenges
- To assess the level of logistics integration
- To see level of logistics factors that affect project performance

1.6. Definition and Terms

Supply chain management: is a broad concept that encompasses physical distribution management which involves planning, implementing and controlling the physical flow of goods, service and related information from point of origin to point of consumption to meet customer requirement at profit (Kotler and Armstrong, 2005).

Supply Chain: is a group of companies which work together to source, produce and deliver goods and services to end customers (Sadler, 2007).

Logistics Management: that part of Supply Chain Management that plans, implements, and controls the efficient, effective forward and reverses flow and storage of goods, services and related information between the point of origin and the point of consumption in order to meet customers' requirements. Council of Supply Chain Management Professionals (2007)

Project Management: is the application of knowledge, skills, techniques and tools to align resources and achieve the objectives of the sponsors within specific constraints of cost, time, and quality.

Telecom Projects: Design, install and configure a network to support certain services and customers

Logistics Integration: System-wide management of entire logistics chain as a single entity, instead of separate management of individual logistical functions.

Warehouse: Warehousing refers to the activities involving storage of goods on a large-scale in a systematic and orderly manner and making them available conveniently when needed.

Customs Clearance: The act of complying with the import and export regulations of a given country, which involves preparation and submission of documentations required to facilitate export or import into the country.

1.7. Significance of the Study

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

With this in mind, this study is believed to pin point the gaps that may exist in logistics practice and gives an insight to ethio telecom management to take timely measures and lessons for the coming new projects.

1.8. Scope of the Study

The logistics management practice of ethio telecom can be seen from two perspectives, operational and project. Depending on the nature of their organization, the two perspectives have different responsibilities and varied level of engagements, though the logistics fundamental principles remain the same.

As tried to address in the statement of the problem, most of ethio telecom projects are not completed within the given timeline, cost and quality. Company report also shows that challenges related with logistics practice are among other factors which believed has contribution on failure to meet the timeline.

Thus this study mainly focuses on the logistics management practice of the project, named as telecom expansion project (TEP) which is undergoing across thirteen circles with vendor financing scheme. However, as the project is still undergoing in some circles, this study is delimited to six project circles located in north and eastern part of Ethiopia including the capital city, where by now the project is fully completed.

Further, as illustrated in different literatures, the logistics activities includes different functions including but not limited to customs clearance, transportation, customer service, inventory planning and management, supply and warehousing. In similar manner, most of telecom projects are turn-key by nature, in which vendors will be responsible to the flow of materials and services end to end including manufacturing, delivery both to the country and specific sites, inventory management and installation up to commissioning.

However, to ensure the smooth flow of material and alignment to the countries import and export regulations, ethio telecom is responsible in part of the logistics activities. With this in mind, this study gives emphasis to main logistics responsibilities of ethio telecom i.e customs clearance, warehousing, transportation and logistics integration.

1.9. Limitation of the Study

Limitation of related literatures in project logistics in general and in telecom sectors in particular was the main limitation of the study.

Even though the logistics practices involve different activities that might give a chance to evaluate and use as an opportunity to create a competitive advantage, this study assesses only four of these activities (warehouse, transpiration, customs clearance and integration) as per the logistics responsibility matrix of the signed contract between ethio telecom and the vendor engaged for the rollout of the project, i.e Huawei Technologies.

Although, logistics is one of the factors that affect project performance, other factors also have an impact on project performance like stakeholder capability, human resource capabilities, financial capacity, geographical topography, failure in feasibility study, political situations and the like. But, in order to manage and reduce complexity for the research, this research does not include other factors stated above. The researcher carefully design questionnaire and interview questions that focused merely on selected logisticspractices against project performance and also avoided any confusing words that may influence respondents' response.

CHAPTER II

Related Literature Review

2.1. What is a Project?

A project is a temporary endeavor undertaken to create a unique product, service, or result. The temporary nature of projects indicates that a project has a definite beginning and end. The end is reached when the project's objectives have been achieved or when the project is terminated because its objectives will not or cannot be met, or when the need for the project no longer exists. A project may also be terminated if the client (customer, sponsor, or champion) wishes to terminate the project. Temporary does not necessarily mean the duration of the project is short. It refers to the project's engagement and its longevity (Kerzner, 2009).

Most authors agree that project management is about achieving time, cost and quality targets, within the context of overall strategic and tactical client requirements, by using project resources. There is also general agreement that project management is concerned with the life cycle of the project: planning and controlling the project from inception to completion. Project resources are resources that are wholly or partly allocated to the project and under the control of the project manager. They are allocated for a specific time, usually from within the standard functional structures that make up the organization.

Project management is the planning, organizing, directing, and controlling of company resources for a relatively short-term objective that has been established to complete specific goals and objectives.

Every project creates a unique product, service, or result. The outcome of the project may be tangible or intangible. Although repetitive elements may be present in some project deliverables and activities, this repetition does not change the fundamental, unique characteristics of the project work.

In contrast, because of the unique nature of projects, there may be uncertainties or differences in the products, services, or results that the project creates. Project activities can be new to members of a project team, which may necessitate more dedicated planning than other routine work. In addition, projects are undertaken at all organizational levels. A project can involve a single individual or multiple individuals, a single organizational unit, or multiple organizational units from multiple organizations (Kerzner, et al., 2009).

Project Success and challenges

According to **Kerzner (2009)**, historically, the definition of success has been meeting the customer's expectations regardless of whether or not the customer is internal or external. Success also includes getting the job done within the constraints of time, cost, and quality. Using this standard definition, success is defined as a point on the time, cost, and quality/performance grid. But how many projects, especially those requiring innovation, are accomplished at this point?

Very few projects are ever completed without trade-offs or scope changes on time, cost, and quality. Therefore, success could still occur without exactly hitting this singular point. In this regard, success could be defined as a cube. The singular point of time, cost, and quality would be a point within the cube, constituting the convergence of the critical success factors (CSFs) for the project (Kerzner, et al., 2009).

Successful project management can then be defined as having achieved the project objectives within time, within cost, at the desired performance/technology level, while utilizing the assigned resources effectively and efficiently, and accepted by the customer.

Some degree of risk always exists in the project, such as in technical, test, logistics, production, engineering, and other areas. Project risks include business, contract relationship, cost, funding, management, political, and schedule risks. Cost and schedule risks are often so fundamental to a project that they may be treated as stand-alone risk categories. Technical risks, such as related to engineering and technology, may involve the risk of meeting a technical performance requirement, but may also involve risks in the feasibility of a design concept or the risks associated with using state-of-the-art equipment or software (Kerzner, et al., 2009).

Logistics risk includes concerns over packaging, manufacturing, lead times, and material availability. The material shortage can contribute to increasing project costs and schedule delays. Even if the workforce is complete as per the project plan, if the material is not there for them to work on then productivity and schedule suffer (Doucet, 2007).

Any project is a time bound assignment. Delays caused by faulty logistics cause not just loss of revenue but also lead to the loss of reputation and customer satisfaction. These are priceless assets, which are almost impossible to recoup once lost. That is why experts say that proper planning is the key to great logistics.

2.2. History and Advancement of Logistics

The word logistics was first associated with the military. During World War II military forces made effective use of logistics models and form of systems analysis to ensure that materials were at the proper place when needed. The term is still widely used in military and military type applications. The 1958 recession and profit squeeze created an environment in which business began searching for more effective cost control systems. Almost simultaneously, many firms realized that physical distribution and logistics were activities whose costs were neither carefully studied nor coordinated. A number of other trends were becoming apparent, and they made it necessary to focus attention on product distribution (Kaveh and Samani, 2009).

Logistics was initially a military activity concerned with getting soldiers and munitions to the battle front in time for flight, but it is now seen as an integral part of the modern production process. The main background of its development is that the recession of America in the 1950s caused the industrial to place importance on goods circulations. The term, logistics, was initially developed in the context of military activities in the late 18th and early 19th centuries and it launched from the military logistics of World War II. The probable origin of the term is the Greek *logistikos*, meaning ‘skilled in calculating’ (BTRE, 2001). Military definitions typically incorporate the supply, movement and quartering of troops in a set. And now, a number of researches were taken and made logistics applications from military activities to business activities (Kaveh and Samani, 2009).

Business logistics was not an academic subject until the 1960s. A key element of logistics, the trade-off between transport and inventory costs, was formally recognized in economics at least as early as the mid-1880s (BTRE, 2001). Based on the American experience, the development of logistics could be divided into four periods. Before the 1950s, logistics was under the dormant condition. Production was the main part of the managers concern, and industry logistics was once regarded as “necessary evil” in this period.

During the 1950s to and 1960s, there was a tendency of applying new ideas of business administration. The Economy’s Dark Continent, regarded the importance of physical distribution and logistics and its impact on the market place performance in American businesses while it was the most neglected area. Lewis’s study (cited in Chang, 1998) in 1956, on the role of air transportation in physical distribution, was the application of “total cost concept” and it pointed out the notions of trade-off between inventory and transportation. From the 1970s onwards, more and more applications and researches of logistics appeared. Due to petroleum price rise in 1973, the effects of logistics activities on enterprises grew. Slow growth of market, pressure of high stagflation, release of transportation control, and competitions of the third world on products and materials all increased the significance of logistics system on planning and business at that time. The further tendency of logistics in the early 21st century is logistics alliance, Third Party Logistics (TPL) and globalized logistics. Logistics circulation is an essential of business activities to sustain competitiveness, however, to establish and manage a big company is costly and may not be economical. Therefore, alliance of international industries could save working costs and cooperation with TPL could specialize in logistics area (Kaveh and Samani, et al., 2009).

2.3. Definition of Logistics Management

Although early definitions such as physical distribution, materials management, industrial logistics and channel management - all terms used to describe logistics - have promoted this broad scope, there was little attempt to implement logistics beyond a company’s boundary, or even beyond its own internal logistics function. Now, retail firms are showing success in sharing information with suppliers, who in turn agree to maintain and manage inventories on retailers’ shelves. Channel inventories and product stock outs are lower. Manufacturing firms operating

under just-in-time production scheduling build relationships with suppliers for the benefit of both companies by reducing inventories (Ronald H Ballou, 2004).

Logistics is the process of strategically managing the procurement, movement and storage of materials, parts and finishing inventory (and the related flows of information) through the organization and its marketing channel in such a way that current & future profitability are maximized through the cost-effective fulfillment of orders (Christopher, M. 1998).

Logistics activities typically include inbound and outbound transportation management, fleet management, warehousing, materials handling, order fulfillment, logistics network design, inventory management, supply/demand planning, and management of third-party logistics services providers. To varying degrees, the logistics function also includes sourcing and procurement, production planning and scheduling, packaging and assembly, and customer service. It is involved in all levels of planning and execution--strategic, operational and tactical. Logistics management is an integrating function, which coordinates and optimizes all logistics activities, as well as integrates logistics activities with other functions including marketing, sales manufacturing, finance, and information technology. (Council of Supply Chain management Professionals)

“Logistics is that part of the supply chain process that plans, implements, and controls the efficient, effective flow and storage of goods, services, and related information from the point of origin to the point of consumption in order to meet customers’ requirements.” (Ronald H Ballou, 2004)

2.4. Why logistics management?

In the history of humanity, from the ancient times till the building of today’s modern society, logistics is not a new idea. Procurement of raw materials and converting them to be serviceable was common to satisfy human needs and wants. What recognized by the profession today as logistics is how to move materials to the required place, known as a point of consumption. The power of customer and customer requirement is increasing in every market (Kaveh and Samani, et al., 2009).

The efficiency and effectiveness of the logistics operation has a considerable influence not only on the business performance of manufacturers but also on the customers' perception of products' quality and services provided by the sellers. If inbound materials flow from the supplier is erratic, the firm's internal operation will not be able to sustain production strategies without a high level of safety stock. Similarly, if the flow of finished goods to the customer is unreliable, the firm's customer base will be dissatisfied. Accordingly, logistics is strategically important in many industries as it is central to achieving competitive advantage (Bowersox, Closs, & Cooper, 2013).

The power of customer and customer's requirements are increasing in every market. In other words, attention to these requirements becomes a means to create a competitive edge and able to win significant market share as the competition becomes more and more intense. Furthermore, some new requirements are added to the customer expectations that were not essential to consider before. In addition to the product requirements, customers are demanding a variety of services along with the products. Occasionally these services become more vital in the eyes of the customers than the product itself. In some situations, it's harder to maintain a competitive edge only through the product itself. In a situation like this it is customer service that can provide the distinctive difference between one company's offer and that of its competitors (Christopher, 2005). Lambert and Stock (2001) define customer services as "a customer oriented philosophy that integrates and manages all elements of the customer interface within a predetermined optimum cost services mix."

For reputed companies, project logistics involves the management and handling of large shipments on a global basis. These shipments would involve heavy equipment; oversized cargo and cargo that is completely time sensitive or requires a very high degree of security. To offer complete project logistics, companies often undertake feasibility studies and come up with customized, tailored solutions.

Generally, the final goal of any logistics system is to satisfy the customer. In fact each component of the logistics system can affect whether a customer receives the right product, at the right place, in the right condition, for the right cost and at the right time (Lambert and Stock 2001). Further, logistics management will give a company control over inbound freight, keep

inventory at optimal levels, organize the reverse flow of goods, and utilize freight moves on the proper transportation modes – all of which can cut costs significantly.

2.5. Logistics Activities

2.5.1. Warehouse Management

A warehouse is a commercial building for buffering and storage of goods or an intermediate area for storing of raw materials or products until they are needed for production or consumption (Chua and Teo, 2008). Warehousing refers to the activities involving storage of goods on a large-scale in a systematic and orderly manner and making them available conveniently when needed. In other words, warehousing means holding or preserving goods in huge quantities from the time of their purchase or production till their actual use or sale. Being an essential component, logistics is a key aspect of modern supply chains and plays a critical role in the success or failure of business today (Frazelle, 2002).

Warehousing is costly in terms of human resources and of the facilities and equipments required, and its performance will affect directly on logistics performance. Inadequate design or managing of warehouse systems will jeopardize the achievement of required customer service levels and the maintenance of stock integrity, and result in unnecessarily high costs.

When considering the level of effort involved in warehouse operations, the greatest expenditure of effort is in the picking process. To gain efficiencies in picking the labor time to pick orders needs to be reduced and this can be achieved in a number of ways. Companies with the most efficient warehouses have the most frequently picked items closest to the shipping areas to minimize picking time. These companies achieve their competitive advantage by constantly reviewing their sales data to ensure that the items are stored close to the shipping area are still the most frequently picked. (Mulama 2012)

The writer also notes that warehouse layout is also important in achieving greater efficiencies. Minimizing travel time between picking locations can greatly improve productivity. However, to achieve this increase in efficiency, companies must develop processes to regularly monitor picking travel times and storage locations. To maximize efficiency, world class warehouse operations have adopted new and updated technology.

Warehouse portrays two critical functions (Lambert and Stock, 2001).

1. Time utility-value created or added to a product by making something available at the right time
2. Place utility- value created or added to a product by making something available at the right place

In addition, contributions of warehouse to business include achieving transportation economies (e.g. combine shipment, full-container load), taking advantage of purchase discount and forward buys, supporting the firm's customer service policies, meeting changing market conditions and uncertainties (e.g. seasonality, demand fluctuations, competitions), accomplishing least total cost logistics commensurate with a desired level of customer service, and providing customer with a mix of products instead of a single product on each order i.e. consolidation(Lambert and Stock, 2001).

Functions of the Warehouse

The basic function of a warehouse is to receive customer orders, retrieve required items, and finally prepare and ship those items. There are many ways to organize these operations but the overall process in most warehouses shares the following common phases (Ramaa, et al., 2012):

- **Receiving** – the process of unloading, inspecting quality and quantity, and disassembling or repacking items for storage
- **Put away** – defining the appropriate location for items and transferring them to the specified storage location to wait for demand
- **Order picking** – retrieving items from their storage locations and transporting them either to a sorting process or straight to the shipping area
- **Shipping** – inspecting, packing, palletizing and loading items into a carrier for further delivery.

Out of these activities, receiving and put away belong to the inbound logistics process which means that they are concerned with the flow of materials coming into the warehouse. Order

picking and shipping, on the other hand, belong to outbound logistics and are concerned with moving materials out of the warehouse.

Warehouse processes

The overall flow structure should facilitate accomplishment of general warehousing objectives. The flow of items through the warehouse can be divided in several distinct phases, or processes.

1. The receiving process is the process encountered by an arriving item. Products arrive by truck or internal transport (in case of a production warehouse). At this step, the products may be checked or transformed (e.g., repacked in to different storage modules) and wait for transportation to the next process.
2. In the storage process items are placed in storage locations. The storage area may consist of two parts: the reserve area, where products are stored in the most economical way (bulk storage area) and the forward area where products are stored for easy retrieval by an order picker. Products in the forward area are often stored in smaller amounts in easily to access storage modules. For example, the reserve storage may consist of pallet racks while the forward storage may consist of shelves. The transfer of items from the reserve storage to the forward storage is called replenishment.
3. Order picking is the next step in the warehouse activities. Order picking refers to the retrieval of items from their storage locations. In order picking process items may be transported to sort and/ or consolidate. Consolidation here means the grouping of items that destined for same need group of customer.
4. Shipping is the final part of the warehouse process. In the working process of shipping the former orders will be checked. The items that need package will be packed and eventually loaded in trucks, trains or any other carrier (Rouwenhorst,2000).

Warehouse Management System

Due to globalization, the increase in complexity of supply chain has also increased the complexity of the roles played by a warehouse for a business. The evolving role of warehouse has exerted significant impacts on the evolvement of warehouse management system (WMS). A

WM is a database driven IT tool used to improve the efficiency of the warehouse by coordinating warehouse activities and to maintain accuracy inventory by recording warehouse transactions Shiau and Lee 2009. Proper and effective use of WMS can greatly increase the efficiency and productivity of a warehouse, thus helping to achieve warehousing costs reduction of the company.

Warehouse management systems can range in complexity from very basic tools to assist warehouse employees in performing daily operations to highly sophisticated systems that replace the warehouse workers entirely.

Warehouse employees (operators) use portable computer terminals to record work performed in real time. The activity performed by an operator is recorded by the computer immediately, not written on paper and recorded in the computer later. The portable terminal is connected to the host computer just like any other workstation.

The most common reasons distributors invest in a WMS are to improve customer service and/or to improve resource utilization (inventory, buildings, and people). A WMS helps improve customer service and resource utilization by eliminating errors. The result of eliminating errors can be measured by inventory accuracy, zero returns due to warehouse errors, checking operations are eliminated, and shortened order lead time and improved on-time delivery performance

A WMS with more advanced capabilities can define tasks, plan and prioritize tasks, assign tasks to operators, and guide the operators to perform assigned tasks. Different tasks could be performed at each level within the same warehouse.

2.5.2. Transportation Management

In logistics transportation management system is the backbone of the operation and it is the key element in logistics management in distribution management, which joins the separated activities in the supply chain. According to (Tseng, Yue, & Taylor 2005), transportation occupies one-third of the amount of logistics costs, so it influences the performance of logistics systems hugely. It is also important to have a collaborative network of shippers, carriers and customers. So good transportation management system reduce costs through better route planning, load optimization,

carrier mix and mode selection, improve accountability with visibility into the transportation chain, provides greater flexibility to make changes in delivery plans and completion of key supply chain execution requirement

Transportation plays a connective role among several steps, it is the planning of all these functions and sub-functions into the system of goods movement in order to minimize cost as a result maximize service to the customers that constitute the concept of business logistics. The system, once put in place, must be effectively managed. (Fair & Williams 1981)

A good transportation system in logistics activities could provide better logistics efficiency, reduce operation cost, and promote service quality. Transportation system is the most important economic activity among components of business logistics systems. Around one-thirds of expenses of enterprises' logistics costs are spent on transportation. According to the investigation of National Council of Physical Distribution Management (NCPDM) in 1982 (Chang, 1988), the cost of transportation, on average, accounted for 6.5% of market revenue and 44% of logistics costs. So without well-developed transportation systems, logistics could not bring its advantages into full play. The operation of transportation determines the efficiency of moving products. The progress in techniques and management principles improves the moving load, delivery speed, service quality, operation costs, the usage of facilities and energy saving. Transportation takes a crucial part in the manipulation of logistics.

Transportation in logistics system has also a role of service quality. By means of well-handled transportation system, goods could be sent to the right place at the right time in order to satisfy customers' demands. Specified pickup and delivery times, predictable transit time and zero loss and damage as well as accurate and timely exchange of information and invoicing are service related in transportation management. It all brings efficiency for the company to satisfy customers. Therefore transportation is the base for efficiency and economy in the business logistics and expands other functions in logistics system. In addition, a good transportation system performing in logistics activities brings benefits not only to service quality but also to company competitiveness (Fair and Williams 1981).

There are two fundamental economic principles that have an impact on transportation efficiency:

1. Economies of scale-decreased transportation cost per unit as the size of a shipment increases
2. Economies of distance-decreased transportation cost per unit of weight as distance increase.

The goal from a transportation perspective is to maximize the size of the load and the distance being shipped while still meeting customer service expectations.

2.5.3. Integration

Integration has been one of the dominant themes in the development of logistics management (Mckinnon, 2001). Logistics management is an integrating function that coordinates all logistics activities (Kwateng, 2014). This integration logistics function enable firms to ensure a smoother and faster flow of material and related information from the point of inception to the point of consumption (Agrawal, 2007).

Logistic integration is one of important variable in measuring the performance(Moshkdanian& Author, 2013).Stock described logistics integration as a logistics practices and operational activities that coordinate the flow of material from supplier to customer throughout the value stream (Gregory, 1998). Bannet and Klug in their studies concluded that logistics integration is a new form of criteria for companies to evaluate the performance between the company and supplier (Bennett, 2012). Moskdanian and Molahosseini in their research demonstrated that there is positive and strong relationship between logistics integration and performance (Moshkdanian& Author, 2013).

Prajogo also believed that improvement in logistics integration contribute to the increasing of operational benefit (Prajogo, 2012).

Logistics integration is viewed as the competency that links an enterprise with its customer and supplier information from and about customer flows throw the enterprise in the formed sales activity, forecast and orders. Thus, the integration is viewed in terms of two interrelated efforts, material flow and information flow (Donald J. Bowersox, 2009).

Integration management is the project management knowledge area that includes processes that are required to ensure that all the projects components are coordinated correctly in order to achieve the project goals. Integration is important from achieving project objectives and most authors have stressed that companies can be able to achieve project objectives through logistics integration.

Material and resource flow

The final goal of any logistics system is to satisfy the customer. In fact, each component of the logistics system can effect whether a customer receives the right product, at the right place, in the right condition, for the right cost, at the right time (Lambert and Stock 2001). Among these criteria, place and time utility have the greater importance and are considering as a measure in determination of efficiency for material and resource flow in the logistics system. (Donald J. Bowersox *et al.*, 2009).

Material flow representing the movement of products or merchandises from a point ‘sender’ to another ‘receiver’ and it consists of raw material, work in process, and finished goods while resource flow makes the material flow possible. Furthermore material and resource flow are the two physical flows in the logistics system. (Donald J. Bowersox *et al.*, 2009).

Inventory flow: is concerned with movement and storage of materials and finished product. (Donald J. Bowersox *et al.*, 2009)

Information flow: In recent times, information has become a key player in determination of productivity of a complex enterprise. Customer order together with all other information flowing between different company’s department and even in beyond the four walls of the company, through the entire supply chain, are so critical in order to support other operations in the system (Donald J. Bowersox *et al.*, 2009).

The speed and quality of the information flow have a direct impact on the cost and efficiency of the entire operation. Slow, erratic communication can lead to not only lost customers but also excessive transportation, inventory and warehousing cost, as well as possible production inefficiencies. In fact, the cost of misunderstanding the actual customer demand is enormous so organizations try to have real and on time information in order to make a proper decision. In such

a scenario, it is necessary to forecast and estimate the demand as exactly as possible, supply raw materials to the point of sale and reorganize the business structure if necessary. To realize these goals a system must seamlessly integrate both information and material flow. Such a system can provide access to information, aid decision making and execution. Therefore, it is quite evident that one of the key constituent of logistics management strategies is information sharing. (Lambert and Stock, 2001)

In other words, the key challenges are how a company can quickly integrate its information systems with those of partners, suppliers and customers to form a smart supply chain. In addition, a thoughtful investment in an information infrastructure that will not become obsolete in a year or a less period of time must be made. To meet these challenges, an enterprise must move from a monolithic information system (using a central database in a neutral format) to a software agents approach in which agents anywhere on the net can sense and act on a defined environment. Therefore, we need to establish a new collaboration infrastructure for the entire supply chain net so that a supply chain management system could act based upon a dynamic environment and be able to easily communicate and collaborate with other systems running in partners' or suppliers' computers (Liu, 2006).

According to Tan (2000), adopting electronic commerce (e-commerce) via the Web has become a key strategy to manage the supply chain. Firms capable of taking advantage of the WWW have a highly developed culture of internal and external collaboration, a vision for process and technological enabled change, and an information system infrastructure capable of supporting WWW based collaboration.

Another point in this matter is the role of information flow in effectiveness of material and resource flow. There is no doubt that in order for material and company's resources to flow smoothly through different logistical activities, a comprehensive information system is required. This is also needed to support other flows of logistics system including monetary flow (Donald J. Bowersox *et al.*, 2009). Material flows are triggered by information, as information is needed for decision-making (Emmet, 2006).

Information is also used to, plan, organize, direct, coordinate, and control. Information flows therefore link internal company activities and also link external suppliers and customers.

Effective information and communication technology will process orders, track and trace progress and provide timely and real time visibility (Emmet, 2006).

Information flow identifies specific location within a logistics system that has requirements and is concerned with directing operations to receive and ship inventory as required to support customer and purchase orders (Donald J. Bowersox *et al.*, 2009).

Operations requirements deal with order management, order processing, distribution operations, inventory management, transportation and shipping and procurement (Donald J. Bowersox *et al.*, 2009)

2.5.4. Customs Clearance

Broadly, customs clearance will be defined as the set of functions undertaken by a national customs authority, which include, but are not limited to processing of import, export, and transit declarations, assessment of origin, value, and classification of goods, collection and processing of duties and fees, physical inspection, examination, and release of cargo, conduct of post-clearance audits, processing of urgent consignments, administration of waivers and exemption schemes and drawback (re-exportation) schemes (McLinden 2005).

According to the World Customs Organization (WCO), one of the focal issues in international trading is the performance of customs and their efficiency in clearing goods. In the modern business environment of just-in-time production and delivery, it has become ever more important that traders are guaranteed fast and predictable release of goods. Being the foremost agency at the border and a prominent player in the release of goods, Customs should therefore strive to reduce the complex clearance procedures and limit information requirements to the bare essentials.

All countries have customs controls in place for revenue generation, domestic economic interests, and national security purposes. While there are similarities between countries (like the universal need for shipment documentation, including commercial invoices and Bills of Lading) there are local, specific requirements that have to be addressed.

Modern customs administrations have recognized that streamlining and simplifying clearance procedures are beneficial to importers, exporters and national economies. Customs

administrations are thus increasingly introducing simplified procedures so as to put in place efficient and effective clearance procedures while maintaining the traditional duties of revenue collection and enforcement. Delays in any customs station can arise due to a variety of reasons, the most frequent ones being determination of the correct classification, the assessment of the value of the goods for customs purposes, and missing documentation².

Key Terms in Customs clearance

A bill of Lading defined as a contract between the exporter and the carrier indicating that the carrier has accepted responsibility for the goods and will provide transportation in return for payment Czinkota et al (2002). The bill of lading can also be used as a receipt and to prove ownership of the merchandise. The customer usually needs the original or a copy of the bill of lading as proof of ownership to take possession of the goods.

Commercial Invoice

Branch (2008) defines Commercial Invoice as a bill for the goods stating basic information about the transaction, including a description of the merchandise, total cost of the goods sold, addresses of the shipper and seller, and to arrange payment terms. The buyer needs the invoice to prove ownership and to arrange payment. Some governments use the commercial invoice to assess customer duties.

Packing List

As defined by Branch (2005), is a mandatory document that carries the details of the shipment, dimensions in terms of weight and volume, shipping marks on all the cargo, covering each and every individual piece or parcel. The packing list is used to identify the parcels as belonging to the particular consignment under the said invoice.

Certificate of Origin

According to Czinkota et al (2002), this is a document used to prove if the consignment originates within the countries with bilateral or multilateral relationship where the parties enjoy favorable tariffs for import duties. Based on this certificate the customs department of the

importing country classifies the cargo under specific schedule. Also, the certificate helps the exporting and importing country to avoid duty, quantity and license restriction.

Customs Duty –A tax levied on goods transported from one jurisdiction to another, especially on goods imported from a foreign country. Customs duties in the modern sense of the term are public taxes on the goods crossing borders of a territory.

Customs Clearing

Customs clearance is sometimes referred as Customs Brokerage; it is a profession that involves the clearing of goods through customs barriers for importers and exporters. It involves the preparation of documents and / or electronic submissions, the calculation and payment of taxes, duties, and excises; and facilitating communication between government authorities and importers and exporters. McLinden (2005)

Clearing Agent

Clearing agent is a one who prepares the bill of entry which is the main document on which the customs approves the valuation and clearance. With standardized INCOTERMS the documents are prepared in advance as soon as the consignment is dispatched from the country of origin, the bill of entry along with the commercial documentation and shipping documents are prepared electronically from the clearing agent's office and then submitted to the customs department.

INCOTERMS are the internationally accepted standard definitions for terms of sale whose abbreviation stand for International Commercial Terms set by International Chamber of Commerce (ICC).INCOTERMS provide common understanding through rules set to clarify responsibilities of sellers & buyer for delivery of goods under the contracts of sale. They apportion transportation costs and the responsibilities associated with delivery of goods to the destination effectively.

Pre-arrival

Pre-arrival processing involves the (electronic) submission of the relevant goods and/or cargo declaration data to the relevant authorities prior to the arrival (for import) or prior to departure (for export) of goods. Authorities are then able to conduct risk assessment and to process the

declaration with a view to prepare the release decision prior to the goods arriving at the port of entry/port of exit, thus enabling the release of the goods immediately upon arrival. This may include communicating the release decision to the persons concerned so that they can continue their supply chain and logistics planning.

Customs Clearance in Ethiopia

Even at this low level of trade turnover, there are constraints associated with border clearance procedures in Ethiopia. A World Bank report consolidates this view by indicating that there are constraints in the clearance of goods in Ethiopia. Unless these constraints are resolved in good time, the problems, besides making “doing current business” difficult, are likely to snowball and further reduce the already low level of trade turnover, thus frustrating the growth of the national economy. (WB;Doing Business 2010, Ethiopia)

The World Bank breaks down trade costs into three general categories, namely, the number of documents that must be processed to ship goods out of or into the country, the time it takes to carry out these procedures and to move goods to the nearest port, and the official fees and commercial costs involved in getting goods from the factory door to customers in other countries.

Stakeholders in Customs Clearance Process

Typically, transit commences at ports of entry. As Ethiopia is, however, a landlocked country commencing transit operations from destination customs stations (for instance, from Kaliti in Addis Ababa) has become necessary. Import operations commence by submitting complete basic import document prepared by declarants and lodged with the web site of ERCA.

The different statutory bodies involved in the transit process are trucker/agent, destination customs station, importer/ Agent/ declarant, ERCA’s Coordinating Office in Djibouti, agent of the importer in Djibouti, trucker, exit gate of Djibouti customs territory, ERCA entry gate (currently via Galafi), Mille cargo scanning station and dry ports(ERCA’s BPR document).

Pursuant to Proclamation Number 622/2009, original supporting documents needs to be supplied to Customs include transportation document, invoice, bank Permit, packing list, certificate of origin and other relevant certificates/permits from relevant regulatory bodies.

Clearance Process

There is a computerized system for following up the performance of each and every customs employee. The number of declarations dealt with by each employee is recorded. If any complaint is lodged against any employee, that employee is recorded. Declarations are traceable electronically. If declarants are not provided with satisfactory services by customs, a system has been instituted by customs for the lodgment of complaints.

Ethiopian shipping and Logistics Service Enterprise

With the intention of providing one stop logistics solution and to minimize huge cost the country incurs in relation to port related and transit charges, the government of Ethiopia established commercial enterprise called (ESLSE) Ethiopian Shipping and Logistics service Enterprise that will provide sea transport, Inland transport up to dry ports, clearance and transit service. The shipping wing currently manage fleet of vessels with combined capacity of 400,000 MT with sea transport service from and to Middle East and Red Sea, Europe, the Gulf and Far East and South Asia (Fekadu, 2013). All imports via sea to Ethiopia are made only by Ethiopian Shipping lines but by securing waiver from the enterprise other liners can be used in the event ESLSE cannot provide the service from the destination. The enterprise also run dry ports in different location including Modjo, Semera, Gelan, Comet ,Kombolcha and others and provide such service as customs clearance, temporary storages, transshipment of goods, stuffing and un-stuffing of containers, consolidation of less than container loads and maintenance and repair of containers.

2.6. Telecom Projects

Development projects in telecommunications require combining good knowledge of the fundamentals of project management with clear understanding of the complexities arising from fast-changing technology, deregulations, standards, accountability, and supply chain management difficulties. This book addresses the much-needed integrative approach very well."

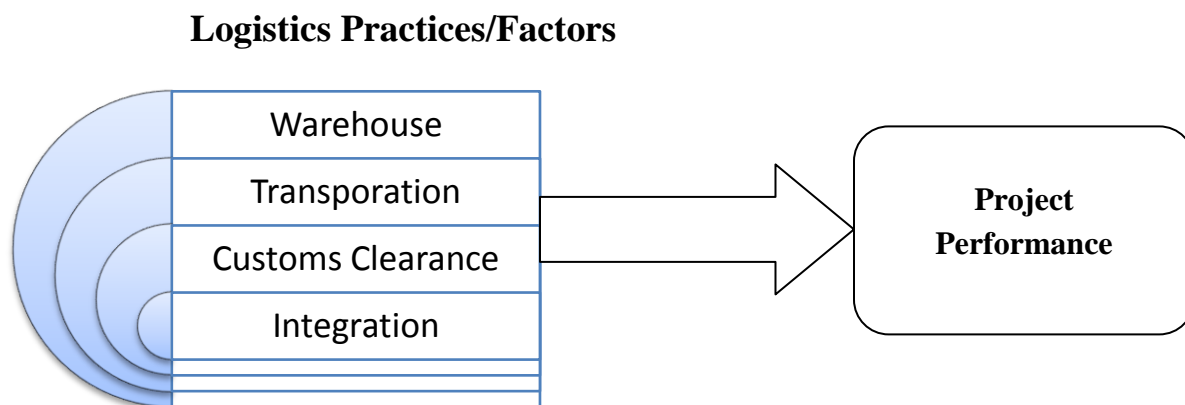
According to M. H. Sherif (2004), delays in Telecommunication Projects emanates from access, weather conditions, such as in the case of laying out cables outdoors or in conduits (rain, snow or heat waves), work rules (the number of work hours per day, holidays, etc., Logistics (shipping,

customs procedures, installation), which are important in the case of international deployment and stakeholders agreement

The main success factor in telecom projects is the logistics to deliver the imported equipment on time (Castro &Carvalho, 2007). When the project management implementation in Brazilian telecommunication companies evaluated, the main success factor is the logistics to deliver the imported equipment on time even if there were some logistics issues that are out of the organization control (Castro &Carvalho 2007).

2.7. Conceptual Framework

Based on overall review of related literature, and the problem statement of the research, the following conceptual framework, in which this specific study governed, was developed as follows:



The framework proposes that logistics practices/factors have an impact on project performance and it can be a cause for project performance challenges if it cannot be controlled effectively. Logistics practices/factors in this framework are constructed in four dimensions. These are warehouse, transportation, customs clearance and integration.

CHAPTER III

Research Design and Method

3.1. Research Design

Research can be classified as exploratory, descriptive and explanatory (Saunders, Lewis and Thornhill, 2007). The objective of descriptive research is ‘to portray an accurate profile of persons, events or situations’ (Robson, 2002). This study, with descriptive research type, tries to assess the logistics practice of ethio telecom expansion project with the purpose of identifying the gaps or problems and propose alternative solutions on logistics practices.

In this study both qualitative and quantitative approaches are used. Quantitative data was collected through questionnaire and qualitative data through interview. This mixed method approach helps to triangulate the data and result collected through survey method (Greener, 2008; Saunders 2007).

Primary data collected using quantitative method was analyzed using descriptive and inferential analysis, and present in tabular forms. Whereas the data obtained using interviews was analyzed qualitatively. The qualitative data gives an advantage of having an in depth insight in logistics practice and related challenges so that results can be presented in more accurate way.

3.2. Data Type and Source of Data

Saunders (2007) defines two types of data, namely primary and secondary. Depending on the research data type and collection method, the researcher can use primary and/or secondary data. For this research, primary as well as secondary data were used.

Primary data was collected through standard, structured and semi-structure questionnaire and interview, while secondary data from company reports, journals, publications and other publicized documents. Primary data originate by a researcher for the specific purpose of addressing the problem at hand (Malhotra and Birks, 2006). According to Adams (2007)

secondary data is data collected by someone else and there is a great deal available to the researcher from books, libraries and on the web.

3.3. Data Collection Method and Time Horizon

Depending on the research data type and source of data, there are different ways of data collection methods. Survey is one type of data collection method which involves asking questions face to face, via telephone or questionnaires to individuals, and departments or companies to find out personal, company or sector information (Adams et al., 2007). Accordingly for this research, structured and semi-structured questionnaire and interview questions were designed to conduct the survey. The questionnaire prepared by mixing ranking, open ended and rating questions, most frequently used five levels of Likert-style rating scale (Saunders et al., 2007).

The questionnaires were shared through secured company mail, the best way to collect data from wide geographical areas and also delivered in person and collected the same way. Moreover, face to face as well as via telephone interview were conducted with selected project rollout and logistics managers and coordinators. The information obtained using interview strengthens the collected information through questionnaire as the interviewee has in depth information in the area.

Cross-sectional study analyzes data collected from a population, or a representative subset, at a specific point in time (Malhotra et al., 2006 and Neuman, 2007). Applying of this design has the advantage of conducting the research on time at reasonable cost. In this research cross-sectional study was applied for the measurement of all variables within a narrow time span or particular time period (Rushton et al., 2009).

3.4. Population and Sample Size of the Study

The target population of this study is ethio telecom staffs who were involved in logistics operation of the project as well as selected project and program managers and coordinators that have direct responsibility in the rollout of the project. The list of target population was collected from Human Resource coordinator of the Telecom Expansion Program Office. According to this data, in North and Eastern circles including the capital city, around 150 staffs were directly

assigned in logistics program or have direct relationship with the logistics activity in one or another way

According to Kathari (2004), as a general rule, sample size must be of an optimum which should be neither excessively large nor too small. Regarding sample size, Corbetta (2003) also discussed that sample size is directly proportional to the desired confidence level of the estimate (z) and to the variability of the phenomenon being investigated, and it is inversely proportional to the error that the researcher is prepared to accept (Corbetta, 2003). For this research I have used Zikmund and Babin (2010) sampling technique by determining the sample proportion success, not success based on previous research response rate.

Saunders et al. (2007), states that the likely response rate shall be reasonably 50% or moderately high. Based on this, the researcher has assumed 70% success response which is anticipated high as most of the questionnaires were distributed and collected through mail.

Regarding the sample size, I have used Kothari (2004) sample size calculation formula in which the size of population is known or has defined size at 95% confidence level.

$$n = \frac{z^2 \cdot p \cdot q \cdot N}{e^2 (N - 1) + z^2 \cdot p \cdot q}$$

Where:

- P = proportion of response rate (p=0.70)
- q = Non response rate (q=0.30)
- z = z score level of confidence of the estimate (95% = 1.96);
- e = marginal error, 5%
- N = population of the sample (150)

$$n = \frac{1.96^2 * 0.9 * 0.1 * 150}{0.05^2 (150 - 1) + 1.96^2 * 0.9 * 0.1}$$

$$n = 72$$

Quota system has been applied for each circle based on sample ratio and hence sample frame is tabulated here under.

Table 3.1: Number of staffs and sample size

Circles	Number of Staff	Sample Size (Quota System)
North Region	20	10
North West	35	17
North East	15	7
East Region/Somali	30	14
Central North	10	5
Addis Ababa	40	19
Total	150	72

3.5. Sampling Procedure and Technique

According to Admas et al. (2007) sampling is the process or technique of selecting a suitable sample for the purpose of determining parameters or characteristics of the whole population. To determine the sample size, the researcher first collect list of staffs involved in the expansion projects from the six circles and calculate the sample size accordingly.

To select respondents, both probability and non-probability sampling techniques were used (Saunders et al, 2007). Simple random probability sampling technique was used to distribute and collect questionnaire from list of staffs. However, based on their relative possession of knowledge and practices of logistics and overall project performance, the non-probability

sampling technique which is judgmental sampling was applied to select managers and coordinators for the interview.

3.6. Ethical Consideration

Research ethics deals with how we treat those who participate in our studies and how we handle the data after we collect them. In this regard, the survey questionnaire has clear introductory and instruction part regarding the purpose of the research and ethicality and respondents were not enforced to return the questionnaire. The researcher keeps respondents' privacy, anonymity (i.e. protecting the identity of specific individual from being known) and confidentiality (i.e. keeps the information in secret) (Saunders et al., 2007).

3.7. Reliability and Validity

To ensure the reliability within the process, the questionnaires were designed based on theory and Cronbach's alpha reliability measurement scale has been used.

According to Adams et al., (2007) internal validity is used to assure the research validity. To threat the internal validity of this research, questionnaires were distributed and collected within one week, and reasonable sample is taken from the population and questionnaires randomly distributed to participant, except for interview question in which purposively and judgmentally selected.

In addition to this, the researcher received comment from the advisor and other Logistics and Supply Chain Management post graduates on the questionnaire and overall research method. A Pilot test of 15 questionnaires were also distributed to test and check the reliability of the items of the questionnaire and to get feedback on the way questionnaire prepared, wording, and coherence, to make the necessary correction. Accordingly, the questionnaire was also pre-tested using Cronbach's alpha reliability measurement scales and the overall result was between 0.66 and 0.99 which shows that the instrument was highly reliable. Cronbach's Alpha values are satisfactory with alpha values between 0.66 and 0.99. (Nunnally and Bernstein, 1994). Also (Minahan 1998), Cronbach's Alpha value, more than 0.6, indicates a satisfactory internal consistency of the measurement items. The researcher excluded pilot test participants from final response.

Trustworthiness about data from interview was established to triangulate the data using multiple data sources, making respondents to review the notes, the data was examined by and discussed with a peer review that have experience in research and my observations also included to make it more credible.

3.8. Data Analysis Technique

SPSS software was used as an instrument to analyze research data. Correctness and completeness of collected data was checked before data encoding in to SPSS software for further analysis. Descriptive statistic is used to describe the collected data, to accurately characterize the variables and summarize a study sample. Correlation and regression analysis also used to draw conclusions about the population from which the sample was drawn.

CHAPTER IV

Data Presentation and Analysis

The purpose of this research is to assess the logistics practice in ethio telecom project implementation. This chapter presents the main part of the study. Collected data using quantitative method was tabulated and analyzed using explanatory descriptive and inferential statistical tools. In addition the qualitative data collected through structure interview will be narrated in every aspects of the information gathered from distributed questionnaire.

In order to conduct this research a total of 72 questionnaires were distributed for staffs involved in the project, and 68 questionnaires were collected, and the remaining 4 questionnaires were not returned timely. Unfortunately from the returned questionnaires 3 of them were not properly filled. So I have excluded them from further analysis. Hence the analysis has been done with 65 properly filled questionnaires which 90% of response rate.

4.1. Reliability Test

Reliability refers to the extent to which data collection techniques or analysis procedures yield consistent findings (Saunders et al., 2007). Dunn (2001) also defines reliability as a measure of stability or consistency across time. Before going to data presentation, analysis and interpretation; Cronbach's Alpha was calculated as part of the reliability test to assess how valid the results were and should produce similar generalized results if the sample size were increase (Field, 2006).

Table 4.1: Cronbach Alpha value

S. No	Variables	Cronbach's Alpha Value	Number of Questions
1	Customs Clearance	.702	5
2	Warehouse	.785	6
3	Transportation	.744	5
4	Integration	.752	5
5	Project Performance	.720	6

The Alpha value ranges from a maximum of 1.0 for a perfect score to minimum of zero, good measure of the alpha should be 0.70 or higher (Neuman, 2007). According to the Cronbach's Alpha values presented in table 4.1, the value of individual variables ranges from minimum 0.702 to maximum value of 0.785.

Therefore, the researcher concluded that the data has internal consistency and is reliable for further analysis.

4.2. Demographic Statistics

The following tables present the demographic information of respondents work experience, project experience and education qualification. This information is very important to see the respondent background in the field and to build confidence on the collected data.

Regarding the respondent work experience in the company, the results in Table 4.2 shows that 43.1% of the respondents have 3 to 6 years and the rest 56.9% have over 6 years' experience in the company. This result indicates that majority of the respondents have long years of work experience in ethio telecom which indicates that they have better understanding in telecom sector.

Table 4.2: Demographic information

Criteria		Frequency	Percent	Valid Percent	Cumulative Percent
Year of Experience	Less than 3 years	-	-	-	-
	3 to 6 years	28	43.1	43.1	43.1
	Above 6 years	37	56.9	56.9	100.0
	Total	65	100.0	100.0	
Project Experience	Less than 1 year	5	7.69	7.69	7.69
	1 to 2 years	21	32.31	32.31	32.31
	Above 2 years	39	60	60	60
	Total	65	100.0	100.0	100
Educational Qualification	High School	0	0	0	0
	Diploma	1	1.54	1.54	1.54
	Bachelor	40	67.69	67.69	67.69
	Maters and above	25	30.77	30.77	30.77
	Total	65	100.0	100.0	100.0

For project experience question asked to the respondents, only 7.69% of the respondents have less than one year experience. The rest 32.31% and 60% have project experience for 1 to 2 years and above 2 years respectively. This implies that majority of the respondents have project experience and better understanding of logistics practice in project context.

The respondents were asked to indicate their educational qualification and the results are presented in Table 4.2 above. The results shows that none of them are high school complete and only 1.54% of the respondents have Diploma. 67.69% of the respondents are under Graduate and the rest 30.77% are post graduates. With this result, we can infer that the respondents can better understand the questions and provide relevant and accurate information needed for the study.

4.3. Descriptive Data Presentation and Discussion

The data collected through questionnaire and interview have been analyzed, presented and discussed in order to give meaningful information. Data are presented in Tables and figures. I have also analyzed the data with the aid of statistical tools, both inferential and descriptive statistics. The information gathered through interview has been narrated.

Both qualitative and quantitative methods have been used to analyze the data under study. Data obtained from questionnaires, interview, documentary sources were carefully checked to ensure completeness, accuracy and uniformity.

4.3.1. Warehouse

Warehouse is one of important functional area in the logistics function, a well-managed warehousing process enhance the efficiency of the company and help to accomplished desired objectives (Kotler, 1992). Generally speaking, a warehouse is a hub in a logistics network where goods are temporarily stored or rerouted to different places (Rushton et al., 2010). Having this in mind, the researcher presents the response in below summary table.

Table 4.3: Response summary related with warehouse

Warehouse Criteria	1		2		3		4		5	
	#	%	#	%	#	%	#	%	#	%
Warehouses Accessibility	5	7.69	6	9.23	11	16.92	24	36.92	19	29.2
Availability of Warehouses	22	33.85	20	30.77	9	13.85	10	15.38	4	6.15
Warehouses Capacity	18	27.69	25	38.46	10	15.38	7	10.77	5	7.69
Warehouse Automation – support of technology	5	7.69	6	9.23	7	10.77	28	43.08	19	29.23
Warehouses Tools - like hand jacks, forklifts, ..etc	4	6.15	8	12.31	7	10.77	28	43.08	18	27.69

Warehouses Accessibility

Referring the question in table 4.3, which is accessibility of warehouse, most of the respondents, which is 36.92% and 29.23% have replied agree and strongly agree respectively on accessibility of warehouses in the regions where projects take place. Whereas, only 7.69% and 9.23% have expressed their strong disagreement and disagreement for the same criteria.

This simply indicates that the company warehouses established for the project implementation are accessible for material movement.

Availability of Warehouses

According to the survey result about availability of warehouses (table 4.3), only 15.38% and 5.15% have replied agree and strongly agree respectively to confirm whether the number of warehouses was enough to smoothly manage the flow of materials. Whereas, majority of the respondents, which account 30.77% and 33.85% of the total respondents have expressed their disagreement and strong disagreement on the number of warehouses respectively.

Further investigation through open ended question indicates that due to wideness of the geographical area covered by the project scope, it builds up the need for a warehouse in between the geographical regions to reduce the transportation costs and to add some value adding activities to the materials. However, warehouses were not available with required standard and size in some regions. Furthermore high rent costs and shortage of time to look all possible options were raised by the interviewee as main challenge to avail required number of warehouses and support the material flow. All project warehouses, except one in Addis, were acquired through rent as confirmed by the interviewee.

So the number of warehouses was limited to some areas and delivery was managed from warehouses established in farther distant region, which leads to higher transportation costs and delivery delays.

Thus from the overall observation, we can depict that the number of warehouses were not enough to smoothly manage the flow of materials due to external constraints.

Warehouses Capacity

For survey question of warehouse's capacity to accommodate project materials for ease of access, free from damage and convenient to load and unload, the respondent's feedback (table 4.3) shows that, 38.46% have disagreed and 27.69% have strongly disagreed on the capability of warehouses to accommodate project materials for ease of access, avoid any damage and convenience for loading unloading. Interview and open ended questions revealed that due to incapability of the warehouses, especially in pick seasons, the teams were forced to place some materials in aisle space and dispatching areas, which highly impact the picking, loading and unloading operations. At some point they were enforced to place some materials in the outdoor space, where they are exposed to rain and direct sunlight that leads to damage and deterioration.

Some interviewee has argued that the warehouse space was not efficiently utilized as warehouses were not equipped with shelving system. As supported in literatures, warehouse efficiency is directly related with efficient space utilization, which is analyzed by floor and vertical space (m^2 and m^3).

This clearly shows that the warehouses were neither incapable to accommodate project materials for ease of access, free from damage and convenient to load and unload nor able to use the advantage of vertical space.

Warehouse Automation

Respondents were asked their agreement on the fact that the warehouse operators were efficient in using computer and other technologies to perform warehouse activities. Majority of the respondents (table 4.3), which is 43.08% agree and also 29.23% strongly agree. Only 9.23% and 7.69% disagree and strongly disagree respectively. 10.77% are neither agree nor disagree.

As the response from the interview reveals, the trust on the operators' ability to use technology tools provided basic training to be given, comes from employees' ability to operate ERP supply chain module implemented in the warehouse. In fact, out of different capabilities of this software, only order and inventory management functionalities are enabled. Inventory data has to be encoded manually, which is highly subject to errors and doesn't give visibility to detail list of materials.

However more advanced and specialized warehouse management software commonly utilize Auto ID Data Capture (AIDC) technology, such as barcode scanners, mobile computers, wireless LANs (Local Area Network) and potentially Radio-frequency identification (RFID) to perform warehouse operations more quickly and consistently with fewer errors and real time information.

Warehouses Tools

Based on the respondent’s feedback (table 4.3), 43.08% and 27.69% have respectively indicated their agreement and strong agreement on availability of handling tools in the warehouses. Only 12.31% and 6.15% have expressed their disagreement and strong disagreement for the same question. Interview questions also revealed that such handling equipment were availed through purchase and rent to support movement of the materials within the warehouse. However, they have stressed that maintenance delay was a challenge for some time.

From the survey result I have found that the available handling tools were enough to manage the warehouse day to day operation.

The researcher further investigated the warehouse operation to triangulate the response and detail assesses its operation through below three questions:

Table 4.4: Response summary related with warehouse detail operation

Warehouse Operation Criteria	1		2		3		4		5	
	#	%	#	%	#	%	#	%	#	%
At warehouse: order picked, packed and shipped perfectly	19	29.23	22	33.85	11	16.92	4	6.15	9	13.85
When you measure the time from order placement to shipment	14	21.54	21	32.31	16	24.62	4	6.15	10	15.38
Clarity of document submitted	9	13.85	9	13.85	23	35.38	15	23.08	9	13.85

The survey reveals that 29.23% and 33.85% respondents are satisfied and strongly satisfied in order picking, packing and shipping perfection of the warehouses. Only 6.15% of respondents

are unsatisfied with this criterion. The interview questions also revealed that there was almost zero complaint on this matter as there was strong controlling system in place.

In terms of percent of orders shipped on time, about 32.31% and 21.54% of the respondents are satisfied and very satisfied respectively. Plus 24.62% of the respondents believe that it's fair. On the other hand only 6.15% of the respondents are unsatisfied on the criterion.

Further investigation through interview revealed that orders initiated by the project team doesn't take into consideration the volume and number of line times when schedule the delivery date. Even if distribution plans are shared on time, implementation was not adhered as planned in most of the time. For this reason the team was forced to work extra hours to meet the delivery schedule.

The result indicates that, the warehouse team has achieved greater efficiency in managing the time from order placement to shipment and securing delivery reliability.

Regarding clarity of documents submitted to warehouses, 35.38% of the respondents believe that it was fair; however 23.08% the respondents are unsatisfied. Other respondents, who respond satisfied and very satisfied, take a sum up share of 27.7% from the total respondents.

According to open ended questions response, some material requisition documents were submitted with an error that leads to double picking, shipping and reverse from sites. This has caused delay in project timeline and unnecessary transportation costs were incurred.

From the result, we can consider that there was some kind of clarity problem on some documents submitted to the warehouse.

4.3.2. Transportation

Transportation is the backbone of operations and it is the key element in logistics management, which joins the separated activities in the supply chain. In order to assess the transportation issues, five constructive questions have discussed below:

Table 4.5: Response summary related with transportation

Transportation Criteria	1		2		3		4		5	
	#	%	#	%	#	%	#	%	#	%
Available efficient trucks	24	36.92	13	20.00	6	9.23	15	23.08	7	10.77
Truck capacity	3	4.62	7	10.77	8	12.31	29	44.62	18	27.69
Achievement of economic of scale from transportation management	34	52.31	17	26.15	4	6.15	8	12.31	2	3.08
The transportation system efficient	28	43.08	20	30.77	7	10.77	7	10.77	3	4.62
Stakeholders satisfaction by transportation efficiency	29	44.62	18	27.69	5	7.69	7	10.77	6	9.23

Availability of Trucks

As it is indicated in the above table 4.5, 23% of the respondents agree that the available trucks are enough for efficient logistics operation, however, 36.92% and 20.00% have expressed their disagreement and strong disagreement respectively. Further investigation from interview and open ended questions also revealed that delivery delays were observed due to truck shortage, which brings complaint from project implementation teams. Plus warehouse operation was to some level impacted as the dispatching area was occupied by picked and ready for shipment materials.

As a result, we can conclude that trucks shortage was a challenge that leads to decline in logistics operation efficiency and has negatively impacted the project performance to some level.

Truck Capacity

The respondents were asked to express their level of agreement for the question “the capacity of the trucks is enough for shipment to be carried on”. Based on their feedback, 44.62% have replied agree and other 27.69% have also stressed the same by replying strongly agree. Only 10.77% and 4.62% responded their disagreement by replying disagree and strongly disagree respectively.

Thus we can conclude that the trucks capacity was enough to accommodate all the shipments at once and help to achieve economies of scale which is one of the fundamental economic principles that have an impact on transportation efficiency. Through economies of scale, one can decrease transportation cost per unit by increasing the size of a shipment.

Achievement of Economies of Scale from Truck Efficiency

According to the respondents feedback (table 4.5), 52.31% strongly disagree that maximum load of trucks was applied to achieve economies of scale. The rest 26.15% have also responded that they disagree. Further to open ended questions result, interviewee has replied that trucks were not assigned based on the shipment size or volume and never been planned to maximize the size of the load. This has resulted in inefficiency of transport operation and increment of related costs.

Literatures argue that the goal from a transportation perspective is to maximize the size of the load and the distance being shipped while still meeting customer service expectations. Thus based on the result, we can conclude that economies of scale were not achieved through consolidating smaller loads into larger ones and reduce the number of trips between destinations.

The Transportation System Efficient

The survey revealed that only 10.77% of the respondents agree that the transportation system of the company was efficient in availing the required trucks timely (table 4.5). Whereas, the remaining 30.77% and 43.08% have replied disagree and strongly disagree on the efficiency of the transport system respectively.

As reflected in an interview and open ended question, the trucks were managed in a pool system and no dedicatedly assigned truck was availed for the project, even if there was some improvement in the middle of the project. So the response time may take days while the materials were ready for shipment and implementation team was on ground awaiting the materials.

By means of well- handled transportation system, materials should be sent to the right place at the right time in order to satisfy the project needs. However, for some time materials could not be sent at the right time due to inefficiency of the transport system to avail truck timely. Thus,

the respondents' feedback indicates that the transportation system was not efficient enough and has resulted in delay of deliveries.

Stakeholder Satisfaction with the Efficiency of Transportation Practice

The respondents were asked if they are satisfied with the efficiency of transportation practice in project implementation and the response summarized in table 4.5. However the survey reveals that 27.69% and 44.62% of the respondents have expressed their disagreement by replying disagree and strongly disagree, respectively.

A good transportation system in logistics activities could provide better logistics efficiency through improvement in the moving load, delivery speed, service quality and operation costs. However as can be observed from the respondents result, more than 70% of the respondents disagree on the efficiency of the transportation practice in project implementation. This depicts that the transportation practice was not efficient to help the project benefit from economies of scale and distance.

4.3.3. Integration

In order to assess the logistics integration, the researcher address six constructive question and interpreted as below:

Table 4.6: Response summary related with Integration

Integration Criteria	1		2		3		4		5	
	#	%	#	%	#	%	#	%	#	%
The level of information sharing	-	-	5	7.69	7	10.77	33	50.77	20	30.77
The vendor keeps fully informed about project changes that affect the logistics operation	15	23.08	10	15.38	11	16.92	18	27.69	11	16.92
The project structure is aligned with the vendor to smoothen the level of	0	0.00	4	6.15	6	9.23	32	49.23	23	35.38

integration										
Regular meetings are held to understand and share information for better integration	2	3.08	5	7.69	7	10.77	30	46.15	21	32.31
The information exchange is supported by IT tool	4	6.15	8	12.31	11	16.92	29	44.62	13	20.00
Strong integration with the vendor plays major role on project success	5	7.69	6	9.23	6	9.23	27	41.54	21	32.31

Satisfaction Level of Information Sharing with the Vendor

As it is presented in above table 4.6 about the satisfaction level of information sharing with vendor, 50.77% and 30.77% of the respondents have responded agree and strongly agree respectively to express their satisfaction on the existence of strong coordination on information sharing with the vendor.

As literatures support, proper information utilization will lead to greater coordination in the chain and a better coordination in the flow of information between partners, which results in growing impacts on the timely delivery (speed), accuracy and cost minimization.

So, from the responses we can easily infer the existence of strong coordination on information sharing.

Vendor's update on Project Changes that affect the Logistics Operation

15.38% and 23.08% of the respondents replied disagree and strongly disagree on vendor's continuous update on project changes that affect the logistics operation respectively. In contrary, 27.69% and 16.92% have confirmed their agreement and strong agreement for the same question respectively.

Even if there is a balance between the two side opposite responses, the interview question favors the agreement in emphasizing that majority of changes were continuously informed in

regular meetings even though some changes were overlooked and impacted the logistics operation.

With this we can conclude that the integration was in better level to address project changes proactively and minimize the negative impact in logistics operation.

The Project Structure is alignment with the Vendor to Smoothen the Level of Integration

On the subject of alignment with the vendor, none of the respondents strongly disagreed, 6.15% disagree, 9.23 % neutral, 49.23% agreed, and 35.38% strongly agreed that the project structure is aligned with the vendor to smoothen the level of integration. This shows that structures were aligned in better way to strengthen the level of integration.

Regular Meetings are held to Understand and Share Information for Better Integration

The survey result reveals that 46.15% and 32.31% of the respondents regard that regular meetings were held to understand and share information for better integration responding agree and strongly agree respectively.

Further investigation on the interview also revealed that regular meetings were held on weekly bases and even it upgrades to biweekly at critical times. The meeting goes in detail about upcoming and pipeline shipments, dispatching plans, challenges and on the like logistics related issues.

With this we can infer that sharing of information across the chain was critical component in achieving an integrated logistics since it is believed that the integration increases collaboration, minimizes uncertainty, increases the speed of material flow, accelerate order fulfillment, reduction of inventory costs, increases the satisfaction of project teams through reliable and fast delivery of materials that improve the project performance.

The Information Exchange is Supported by IT Tool

Based on the survey result, only 12.31% and 6.15% have replied disagree and strongly disagree respectively on application of IT tools in for information exchange. Whereas majority of the respondents, i.e 20% and 44.62% have replied agree and strongly agree respectively. As per the

interview result, secured electronic company mails were used for information exchange as IT tool.

Now a day's more secured and advanced electronic information interchange platforms are available, however regarding the significance of technological aspect of information integration, it is the frequency, the quantity and the quality of information that is shared that really matters. Thus we can conclude that IT tools have supported the information exchange.

Strong Integration with the Vendor Plays major Role on Project Success

Regarding the role of integration for project success, almost 32.31% and 41.54% of the respondents have replied strongly agree and agree to regard strong integration with the vendor plays major role on project success.

Interview respondents also revealed that regardless of critical and inevitable project challenges, the strong integration established with the vendor has helped to improve logistics performance and increase operational effectiveness that greatly contribute to the success of the project.

4.3.4. Customs Clearance

In order to assess the customs clearance activities for the supply of project material, the researcher address five constructive question and interpreted as below:

Table 4.7: Response summary related with customs clearance

Customs Clearance Criteria	1		2		3		4		5	
	#	%	#	%	#	%	#	%	#	%
Tax payment process affect efficiency of the clearance process	20	30.77	24	36.92	11	16.92	7	10.77	3	4.62
There is good practice from vendor side in sending shipment schedule and complete documents timely	5	7.69	12	18.46	11	16.92	24	36.92	13	20.00

Availability and efficiency of customs clearing agencies are satisfactory	7	10.77	15	23.08	11	16.92	21	32.31	11	16.92
Due to different reason, there was delay on customs clearing activities	4	6.15	7	10.77	6	9.23	26	40.00	22	33.85
Nature of telecom products has impact on customs clearance process	3	4.62	6	9.23	9	13.85	28	43.08	19	29.23

Tax payment process affect efficiency of the clearance process

The survey revealed that 30.77% of the respondents have strongly disagreed and other 36.92% have disagreed that the tax payment process has affect efficiency of the clearance process. As observed in the interview question, as part of Government’s investment incentive, most of telecom project materials are imported tax free and it only needs to acquire exemption of consignments from the Ethiopian Investment Agency. In fact the tax will be calculated just for reporting purpose, however, the payment process, which needs considerable time is cleared off to save quite ample time.

As a matter of fact some has regarded exemption acquiring as delaying step in clearing process since it is applied for every consignment and rarely takes longer time than anticipated.

Vendor’s practice in sending shipment schedule and complete documents timely

Regarding shipment schedule and document sharing practice of the vendor, 24 respondents (36.9%) and 13 respondents (20%) responded agree and strongly agree respectively that the vendor send the said documents and information timely. Only 18.46% and 7.69% of the respondents have expressed their disagreement for the same question.

As resulted from the interview questions, shipment documents required for the customs clearance are directly send to the consignee without the involvement of banks. This is because the project cost is covered by the vendor through vendor financing scheme and there is no

payment to be effected to the vendor through banks presently. Plus due to the privilege given for government organizations to clear shipments through pre arrival process, scanned shipping documents send through email were used to clear most of the shipments prior to arrival.

As agreement reached between the vendor and ethio telecom, shipment documents should be shared through email within 2 days for air shipment and within 7 days for sea shipment. And this was adhered in most of the times as confirmed by the interviewees.

Shipment schedule and related information were exchanged by both parties on daily bases to track the progress and escalate issues that may arise in due course.

Thus we can conclude that the vendor has good performance in sharing shipment schedule and related documents, to enhance the customs clearance and release of the materials timely.

Availability and efficiency of customs clearing agencies are satisfactory

Concerning satisfaction on availability and efficiency of customs clearing agents, most of the respondents which is 16.92% and 32.31% have responded agree and strongly agree respectively. Unlikely 23.08% and 10.77% have replied disagree and strongly disagree for the same question.

From the interview feedback on the same topic, it's understood that employees' turnover and system failures impact the agent's efficiency at some level. Plus, due to the government direction to use Ethiopian Shipping and logistics Enterprise as a sole clearing agent, it limits the options of looking other private agencies. In fact, the interviewee has strongly confirmed that the Enterprise has been very supportive in giving at most priority for project shipments.

Thus from both responses, we can infer that the availability and efficiency of customs clearing agencies are moderately satisfactory.

Due to different reason, there was delay on customs clearing activities

Respondents were asked their opinion whether delay in customs clearance result in delay on project implementation timeline. 40% and 33.85% of the respondents have replied agree and strongly agree respectively and only 10.77% and 6.15% have responded disagree and strongly disagree respectively.

Further investigation through interview question indicates that the unreasonable sources of clearance delays are found in payment of duties and other port charges, inspection processes, approvals from legal bodies/agencies, and duty exemption procedures. Bearing in mind weekends and unjustified days, the time required for each stage reach up to 20 to 25 days which quite ample to impact the project timeline.

As the lead time for the customs clearance process has been considered by the project as important milestone, the schedule of deliveries agreed during signing of contract is extended by the delay of clearing activities.

This clearly indicates that delay in clearing activities impede the execution of the project by lack of materials delivery.

Nature of telecom products has impact on customs clearance process

Concerning nature of telecom products impact on customs clearance process, 43.08% and 29.23% of the respondents have replied agree and strongly agree respectively. Further investigation through interview question revealed that due to security and regulatory concerns, telecom products demands special permits from security agencies and regulatory offices. This additional step applied only for telecom equipment, requires extra time from the normal processing lead time.

Based on this fact, we can say that the nature of the equipment has significant impact on the clearance process.

Form the final open ended question that inquire the possible challenges of customs clearance, both respondents and interviewees have strongly stressed that delay of uplifting of containers from Djibouti port and transferring to respective dry ports was the main challenge for the customs clearance process and believed to have negative effect on the project performance. Even though there was strong communication and support to prioritize project consignments, external factors like shortage of trucks and congestions of vessels at the sea port were main source of delay in the other end. At some point, such delays took close to one month and were a threat to the project in meeting project targets.

4.4. Logistic Factor Ranking Analysis

The respondents were asked to rank the logistics practices from their impact on project performance, one for the highest and four to the lowest rank. The overall ranking result is presented in below table 4.8.

Based on their feedback, the logistics factors were evaluated by ranking their mean value. Thus, in below table, the low mean indicates high impact while the highest mean has the least impact in project performance from given four logistics' factors.

Table 4.8: Response summary related with logistic factors ranking

	Custom Clearance	Warehouse	Transpiration	Integration
Mean	3.6923	2.9692	2.0308	1.3077
N	65	65	65	65
Rank	4	3	2	1

Among the four logistic factors, integration takes the lion share in highly impacting the project performance with mean value of 1.3. The remaining transportation, warehouse and customs clearance have impacted the project performance orderly having mean value of 2.03, 2.96 and 3.69 respectively.

4.5. Correlation Analysis

To determine the existence and level of association, the researcher used bivariate correlation from which Pearson's correlation coefficient is considered. Pearson's correlation coefficient falls between -1.0 and +1.0, which indicates the strength and direction of association between the two variables. The bivariate correlation of a two-tailed test confirms the presence of statistically significant difference at probability level $p < 0.05$ i.e. assuming 95% confidence interval on statistical analysis (Field, 2005).

Table 4.9: Correlation table

		Warehouse	Transportation	Integration	Customs Clearance	Project Performance
Warehouse	Pearson Correlation	1				
	Sig. (2-tailed)					
	N	65				
Transportation	Pearson Correlation	.535**	1			
	Sig. (2-tailed)	.000				
	N	65	65			
Integration	Pearson Correlation	.274*	.255*	1		
	Sig. (2-tailed)	.027	.040			
	N	65	65	65		
Customs Clearance	Pearson Correlation	.435**	.309*	.109	1	
	Sig. (2-tailed)	.000	.012	.387		
	N	65	65	65	65	
Project Performance	Pearson Correlation	.504**	.530**	.619**	.450**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	65	65	65	65	65
** . Correlation is significant at the 0.01 level (2-tailed).						
* . Correlation is significant at the 0.05 level (2-tailed).						

The classification of the correlation coefficient (r) is as follows: 0.1 – 0.29 is weak; 0.3 – 0.49 is moderate; and > 0.5 is strong (Field, 2005). The Pearson correlation analysis shows that all logistics factors have positive and significantly correlated with project performance, specifically integration at r=0.619, transportation at r=0.530, warehouse at r=0.504 and customs Clearance at r=0.450. Thus it can be concluded that there are positive correlations between logistics factors and logistics performance.

4.6. Regression Analysis Assumption Test

4.6.1.1. Collinearity Test using Tolerance and VIF

The multicollinearity in this study was checked using the Tolerance and VIF value. As it is showed in the table 4.10, all independent variables (logistics practices) have a Tolerance value greater than 0.1 and a VIF value less than 10 so the data has not multicollinearity problem. The VIF, which stands for variance inflation factor, is computed as “1/tolerance,” and it is suggested that predictor variables whose VIF values are greater than 10 may merit further investigation (Robert, 2006).

4.6.1.2. Auto-correlation Assumption /Durbin–Watson test/

It is the assumption of independent error acceptable test. Durbin-Watson used to test for serial correlation between errors. The test statistic can vary between 0 and 4, with a value of 2 meaning the residuals are uncorrelated (Field, 2006). A value greater than 2 indicates a negative correlation between adjacent residuals, whereas a value below 2 indicates a positive correlation. Similarly, Ott and Longnecker (2001) defines when there is no serial correlation, the expected value of the Durbin–Watson test statistic d is approximately 2.0; positive serial correlation makes $d < 2.0$ and negative serial correlation makes $d > 2.0$. Although, values of d less than approximately 1.5 (or greater than approximately 2.5) lead one to suspect positive (or negative) serial correlation.

If serial correlation is suspected, then the proposed multiple regression models are inappropriate and some alternative must be sought. Having this and referring table 4.11 the Durbin-Watson value of this research is 1.891 and it is below 2; therefore, the auto-correlation assumption has certainly met and the logistic factors have positive serial correlation with project success.

4.6.1.3. Multi-collinearity Test using Person Correlation Coefficient

The other assumption is checking the value of Pearson correlation coefficient among predictor's variables. If Pearson correlation coefficient (r) value among predictors are below <0.9 , there is no substantial correlation between predictor variables so there is no multi-collinearity problem (Field, 2006). As shown above table 4.9 all the Pearson correlation coefficient values (r) between predictors are below 0.90. Therefore, multi-collinearity assumption is satisfied and don't have collinearity problem so that it is able to obtain unique estimates of the regression coefficient.

4.7. Regression Analysis

Kothar (2004) define regression analysis as a statistical method to deal with the formulation of mathematical model depicting relationship amongst variables which can be used for the purpose of prediction of the value of dependent variable, given the value of the independent. Linear regression estimates the coefficients of the linear equation, involving one or more independent variables that best predict the value of the dependent variable. Multiple linear regressions were conducted to identify the relationship and to see the effect of logistics practices on project performance. In order to show the level of impact of logistics practices on project performance, the researcher checked the significant value of standardized coefficients.

4.7.1. Standardized Coefficients

Standardized regression coefficient (Beta) is the estimated coefficient indicating the relationship between the logistics practices and project performance expressed on a standardized scale where higher absolute values indicate stronger relationships (range is from -1 to 1) (William and Barry, 2010).

Table 4.10: Standardized coefficients of regression analysis

Coefficients ^a							
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	-.090	.354		-.255	.799		
Customs Clearance	.207	.089	.221	2.044	.043	.802	1.247
Warehouse	.266	.086	.245	2.133	.037	.615	1.625
Transportation	.375	.082	.349	2.806	.007	.693	1.443
Integration	.453	.077	.405	5.906	.000	.908	1.102

a. Dependent Variable: Project Performance

Based on regression analysis in the above table, Beta weight reveals the level of relationship of warehouse, transportation, integration and customs clearance. This indicates that any improvement and/or failure in the logistics practices affect the project performance while other variables being held constant.

The beta value on the coefficient table indicate, any improvement and/or failure on logistics factors will affect the project performance by 0.221, 0.245, 0.349 and 0.405 respectively in ascending order to customs clearance, warehouse, transportation and integration.

Therefore, the logistic factors have significant impact on project performance at the level of integration ($\beta = 0.405, p < 0.000$), transportation ($\beta = 0.349, p < 0.007$), warehouse ($\beta = 0.245, p < 0.037$) and customs clearance ($\beta = 0.221, p < 0.043$).

4.7.2. Coefficient of Determination

Model summary table describes the overall predictor value relation with predicting dependent variables. It gives a value of R square, which measures how much of the variability in the outcome is accounted for the predictors.

Table 4.11: Regression analysis model summary

Model Summary ^b					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.62 ^a	.452	.433	.133	1.891
<i>a. Predictors: (Constant), Integration, Customs Clearance, Transportation, Warehouse</i>					
<i>b. Dependent Variable: Project Performance</i>					

Regression standardized coefficients can take on any value between 0 and 1, and it measures the proportion of the variation in a dependent variable that can be explained statistically by the independent variable(s) (Saunders et al., 2012). R square tells us how much of the variance in dependent variable is accounted for by the regression model. From the sample, the adjusted value tells us how much variance in dependent variable would be accounted for if the model had been derived from the population from which the sample was taken (Field, 2006).

Regression coefficients (R) and R Square of the research are 0.62 and 0.452, respectively. This indicates that the correlation among the logistic factors and project performance is positive relationship i.e. and improvement/failure in the logistic factors cause a corresponding effect in project performance. According (William and Barry, 2010) no cutoff regression coefficient values exist that can distinguish an acceptable amount of explained variation across all regression models. But most of authors agree that largest R square indicate that the most important to explain the dependent variable. For this research, the result indicates that the regression R square value is below 50% which is 45.2%, so there are other factors or variable(s) that should be discussed as predicting factor as pointed in scope of the research.

4.8. Analysis of Variance /ANOVA/

ANOVA tests indicate that whether the model is significantly better at predicting the outcome than using the mean as a ‘best guess’ (Field, 2006). ANOVA model is more likely to be significant, indicating that at least one group mean is different from another group mean. ANOVA is the appropriate statistical technique to examine the effect of a less-than interval independent variable on at-least interval dependent variable. If the F test result is not significant, the model should be dismissed (William and Barry, 2010).

Table 4.12: ANOVA table for delivery reliability

ANOVA ^a					
Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	2.574	4	.644	13.485	.000 ^b
Residual	2.863	60	.048		
Total	5.438	64			

a. Dependent Variable: PpM

b. Predictors: (Constant), InM, TrM, CcM, WhM

The ANOVA test result of logistic factors on above table 4:12 indicates that F value is 13.485 which is significant at $P < 0.001$ levels. Therefore, from the result, it can be concluded that with 45.2% of the variance (R square), logistic factors are significant and appropriately measure the project performance.

CHAPTER V

Summary, Conclusion and Recommendation

This chapter presents the summary of research findings and conclusion drawn from the analysis as well as the recommendation based on the finding results.

5.1. Summary of Findings

This study tries to assess the logistics practice of ethio telecom project implementation and its effect in project performance.

Warehouse

- The number of warehouses was not enough to create space and timeutility and control transportation costs. Mainly such problems emanates when project teams fail to consider such factors during the planning stage.
- Plus warehouse space was not enough to accommodate the materials in proper and safe way. However the investigation has revealed that the warehouse space was not efficiently managed as it was only the floor space used to store the materials. No shelving system was in place to take the advantage of vertical space.
- Order placed by the project team doesn't consider the required lead time for picking, packing and shipment. Unreasonable delivery schedules were defined that puts unnecessary burdens on the warehouse team and may leads to picking and shipping errors. Document error was also a cause for wrong shipment that resulted in additional transportation costs and rework in the warehouse.
- No warehouse management system is in place to support the day to day operation. The warehouse process is tedious and can be considered as manual warehouse.

Transport Management

- The survey result shows that there was incompetent transportation management in meeting the project requirement which has resulted in inefficient logistics practice.
- The system inefficiency was manifested in shortage of trucks, poor response rate and uneconomical use of truck capacity. This has resulted in delivery delays, poor service quality, and increased operational cost on the other hand it directly affect project performance.

Integration

- The results given on the integration entails that there was a considerable integration with the vendor that helped to improve logistics performance and increase operational effectiveness through exchange of accurate and timely information and efficient utilization of the information.
- The information exchange was supported by information network and ongoing discussions. The integration was also founded on strong belief that regards it as key factor for efficient logistics operation and has great contribution for the success of the project.

Customs Clearance

- The tax exemption privilege has enhanced the speed of the clearance process bailing out the tax payment step, which is main source for unjustified delay both internally and externally. However the process of getting the tax exemption also needs improvement not to offset the advantage gained through tax exemption.
- The process of getting special import permits for telecom equipment, from statutory bodies like Information Network and Security Agency (INSA) and telecom regulator bodies, was one of the reasons that prolong the customs clearance process. As it may take days in some points at a time, it needs intervention to manage it in a better way.

- Pre arrival process is one of the opportunities the logistics operation gains advantages of curtailing the clearance process time and expedites release of the goods without delay. However, limitation of the customs clearing agency services of sea shipments to ESLSE inversely affects the clearance process.

Thus, from the overall correlation and regression analysis results, the researcher finds out that:

- The correlation analysis indicates that there is a positive correlation between logistic factors and project performance. Accordingly, integration has highest correlation value than others factors and then transportation, warehouse and customs clearance follow in descending order per Pearson correlation (r) value of 0.619, 0.530, 0.504 and 0.450, respectively.
- The regression standardized coefficients (R^2) indicates that 45.2% of project performance can be predicted from logistics practices. Although other factors have impact on project performance, logistic factors also have a significant impact on cost, quality and time aspects of projects.
- The statistical analysis shows that the significance and level of logistics practices effect on project performance. All the four constructs of logistic factors have a significant association with project performance. The standard coefficient value also indicates any improvement and/or failure on logistics practices, integration, transportation, warehouse and customs clearance, will affect the project performance by 40.5%, 34.9%, 24.5% and 22.1% respectively in descending order.

5.2. Conclusion

Based on the findings presented in the previous section, the following conclusions are drawn.

- The transportation management system of the company results in inefficient logistics practice. Late delivery, not achieving economies of scale and distance to minimize unit cost of transportation are the major problems drawn.

- The logistics concept requires accurate scheduling of materials to programmed delivery dates keyed to actual site delivery and storage arrangements.
- Warehouses were inefficient in space utilization and performance and productivity of the warehouse suffered as the operations were manually carried when it could be more easily and more effectively done using warehouse management systems.
- Special permit from statutory bodies/agencies and high loading down time at the port of Djibouti were unreasonable source of clearance delays which needs to be properly addressed.
- Based on regression analysis, there is a positive significant relationship between warehouse, transportation, integration, customs clearance and project performance.
- In general, the logistic factors have impact on project performance at standard regression coefficients (R Square) 45.2%. This indicates that the correlation among the logistic factors and project performance has positive relationship i.e. any improvement/failure in the logistic factors causes a corresponding effect in project performance.

5.3. Recommendations

Based on the above study findings, the researcher suggests the following points as credible recommendation to the problem.

- To alleviate warehouse space problem, use of shelving system in the warehouse is highly recommended. Shelves are very helpful to organize work spaces and makes locating and picking easy for warehouse employees, which enhance warehouse efficiency as a result. It also reduces the number of accidents that take place in warehouses, as they help to organize and store things in an efficient manner.
- Performance and productivity of the warehouse suffered as the operations are manually carried. Thus ethio telecom has to implement warehouse management system (WMS) which is an enabling factor for performance and productivity improvement.

- Provided unavailability of standardized warehouses and space constraints, orders and shipments have to be optimal and aligned with the available space.
- To achieve economies of scale and distance to minimize the transportation cost per unit of items, ethio telecom should work on shipment consolidation to apply maximum load of trucks. and consider the route of the distance to deliver materials
- For truck shortage problem, ethio telecom has to analyze the available truck against the project need and look for alternative ways of solving the problem like outsourcing the service to third party logistics providers.
- Implementation of fleet management system improves the visibility of available trucks and improves fleet operation efficiency and productivity that result in reduced transportation costs,
- Service level agreements have to be signed with statutory bodies to agree on reasonable time required to process the permits, sensitize their employees about the project, and hold liable when the time exceed the agreed timeline that result in delay in customs clearance process.
- Since the logistics practice is correlated with project performance, consideration of logistics factors needs early involvement in the project design phase. Furthermore, as the telecom projects are relatively big and spend a lot of money on logistics, smaller improvements can generate large savings.
- The integration should exceed beyond information exchange through email and plan to strengthen the integration though advanced systems like enterprise resource planning (ERP) and warehouse management systems (WMS) for order and inventory management; and document and information sharing.

5.4. Suggestion for Further Study

Based contractual responsibility, this study has focused only on four logistic factors that may have impact on project performance. However, as indicated in the scope of this research, there are other factors that affect project performance. Hence researchers may expand the scope and further investigate including other parameters.

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ASurvey Questionnaire
On Assessment of Telecom Expansion Project Logistics Practice
(To be filled by ethio telecom Staffs)

Dear Participants:

My name is Mesay Woubshet and I am conducting a thesis entitled “Assessment of Logistics Practice in Project Context, the case of Telecom Expansion Project (TEP)” for partial fulfillment of my M.A. in Logistics and Supply Chain Management at AAU. The main purpose of this questionnaire is to collect necessary data for the aforementioned study from the staffs participated in telecom expansion project. The information you provide will be used only for the academic purpose and will be kept strictly confidential.

Appreciating your willingness, time and cooperation, you are kindly requested to fill the questionnaire carefully and responsibly based on your experience in telecom expansion project since the outcome of this study will highly depend upon your response.

Best Regards,

Mesay Woubshet; EMAIL:-masu05@gmail.com

I. General Information

Please put a tick mark (✓) on the appropriate response category:

1.1. For how long have you been working for ethio telecom?

- | | |
|---|--|
| <input type="checkbox"/> Less than 1 Year | <input type="checkbox"/> 3-5 Years |
| <input type="checkbox"/> 1-2 Years | <input type="checkbox"/> More than 5 Years |

1.2. How long have you been in the project?

- | | | |
|---|------------------------------------|--|
| <input type="checkbox"/> Less than 1 year | <input type="checkbox"/> 1-2 years | <input type="checkbox"/> 2 years and above |
|---|------------------------------------|--|

1.3. Educational qualification:

- | | | | |
|----------------------------------|----------------------------------|-----------------------------------|--------------------------------------|
| <input type="checkbox"/> Masters | <input type="checkbox"/> Diploma | <input type="checkbox"/> Bachelor | <input type="checkbox"/> High School |
|----------------------------------|----------------------------------|-----------------------------------|--------------------------------------|

II. Research Questions

For below questions, **please indicate your position by putting check /√/ mark** under each evaluation statement:

<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>
<i>Strongly Disagree</i>	<i>Disagree</i>	<i>Neutral</i>	<i>Agree</i>	<i>Strongly Agree</i>

2.1. Customs Clearance

Indicate your level of agreement on customs clearance practices:

No	Variables	Evaluation Rate				
		1	2	3	4	5
1	Tax payment process affect efficiency of the clearance process	1	2	3	4	5
2	There is good practice from vendor side in sending shipment schedule and complete documents timely	1	2	3	4	5
3	Availability and efficiency of customs clearing agencies are satisfactory	1	2	3	4	5
4	Due to different reason, there was delay on customs clearing activities	1	2	3	4	5
5	Nature of telecom products has impact on customs clearance process	1	2	3	4	5

2.2. Warehouse

Indicate your level of agreement on warehouse management practices

No	Variables	Evaluation Rate				
		1	2	3	4	5
1	Standard warehouses are available at ease in towns where projects takes place i.e accessibility, capacity	1	2	3	4	5
2	The number of warehouses were enough to smoothly manage the flow of materials	1	2	3	4	5
3	Computerized data base was used to manage the materials in each warehouse.	1	2	3	4	5
4	Warehouse operators are skilled to use computer and other technologies to perform warehouse activities	1	2	3	4	5
5	Warehouse operators use digital tools to capture shipment information	1	2	3	4	5
6	The warehouses are equipped with necessary handling tools like hand jacks, forklifts, ..etc	1	2	3	4	5

From your experience, how satisfied you are by the service operation of project warehouses.

No	Variables	Evaluation Rate				
		1	2	3	4	5
1	I satisfied by order picked, packed and perfect shipment	1	2	3	4	5
2	I received shipment as per standard set time for my request	1	2	3	4	5
3	I don't challenged due to document error or incompleteness	1	2	3	4	5

2.3. Transportation

Rate the overall level of transport management during project implementation

No	Variables	Evaluation Rate				
		1	2	3	4	5
1	The current practice or system of transportation provides efficiency in logistics	1	2	3	4	5
2	The transportation system of the company, like timely delivery and safety, satisfy internal customer	1	2	3	4	5
3	The available trucks are enough for efficient logistics operation	1	2	3	4	5
4	The response for truck request is satisfactory	1	2	3	4	5
5	The capacity of the trucks is enough for shipment to be carried on	1	2	3	4	5

2.4. Integration

Indicate your level of agreement on integration during project implementation

No	Variables	Evaluation Rate				
		1	2	3	4	5
1	The level of information sharing with the vendor is satisfactory	1	2	3	4	5
2	The vendor keeps fully informed about project changes that affect the logistics operation	1	2	3	4	5
3	The project structure is aligned with the vendor to smoothen the level of integration	1	2	3	4	5
4	Regular meetings are held to understand and share information for better integration	1	2	3	4	5
5	The information exchange is supported by IT tool	1	2	3	4	5

2.5. Measure logistics impact in project performance

Indicate your level of agreement in project performance

No	Variables	Evaluation Rate				
		1	2	3	4	5
1	There was defect of material due to improper warehouse handling that affect the project performance	1	2	3	4	5
2	Incomplete shipment has occurred due to coordination problem	1	2	3	4	5
3	Project performance is highly affected by inefficient transportation management	1	2	3	4	5
4	Warehouse operation has been reported as the cause for project material delay	1	2	3	4	5
5	Resource has been idle because of weak integration among stakeholder	1	2	3	4	5
6	Delay of project material handover has been observed due to custom clearance inefficiency	1	2	3	4	5

III. Logistic Factor Ranking

In your opinion, which logistic factor has affected the project implementation? Please give rank 1 to 5; 1 for the highest, 2 for the second, 3 for third and 4 for least challenging factor.

No	Factors	Rank
1	Warehouse	
2	Transportation	
3	Custom Clearance	
4	Integration	

- - - THANK YOU FOR YOUR COOPERATION! - - -

Annex II

Interview Guide

How the transport system was managed compared with project requirement?

What problems were there related with the transport management? How can this area be improved?

What method is used for information exchange between project stakeholders?

How important was logistics for the project?

How was the warehouse site selected?

How was picking, staging and loading performed?

Were there any warehouse issues that affect the release of the materials on time?

Were there any customs clearance issues that affect the release of the materials on time?

What problems were there in the logistics operation that may affect the project performance?

Are there any bottlenecks in warehouse operation?

How do you evaluate the warehouse capacity and space utilization?

Was the storage facility owned, leased or rented?

Was there any warehouse management system implemented in the warehouses and how do you evaluate the warehouse operator's efficiency in using these systems?

How many warehouses were organized and how do you rate their convenience from the project need?