



**ST. MARY'S UNIVERSITY
SCHOOL OF GRADUATE STUDIES**

**INTERNAL SUPPLY CHAIN PERFORMANCE ANALYSIS OF
ETHIO TELECOM**

BY

AFERA MULUADAM KEBEDE

MARCH, 2014

ADDIS ABABA, ETHIOPIA

**INTERNAL SUPPLY CHAIN PERFORMANCE ANALYSIS OF
ETHIO TELECOM**

BY

AFERA MULUADAM KEBEDE

ID №: SGS/0042/2004B

**A THESIS SUBMITTED TO ST.MARY'S UNIVERSITY, SCHOOL OF
GRADUATE STUDIES IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE DEGREE OF MASTER OF BUSINESS
ADMINISTRATION (GENERAL)**

MARCH, 2014

ADDIS ABABA, ETHIOPIA

**ST. MARY'S UNIVERSITY
SCHOOL OF GRADUATE STUDIES
FACULTY OF BUSINESS**

**INTERNAL SUPPLY CHAIN PERFORMANCE ANALYSIS OF
ETHIO TELECOM**

BY

AFERA MULUADAM KEBEDE

ID №: SGS/0042/2004B

APPROVED BY BOARD OF EXAMINERS

Dean, Graduate Studies

Signature & Date

Advisor

Signature & Date

External Examiner

Signature & Date

Internal Examiner

Signature & Date

DECLARATION

I, the undersigned, declare that this thesis is my original work, prepared under the guidance of **Matewos Ensermu (PhD)**. All sources of materials used for the thesis have been duly acknowledged. I further confirm that the thesis has not been submitted either in part or in full to any other higher learning institution for the purpose of earning any degree.

Afera Muluadam Kebede

Name

Signature & Date

ENDORSEMENT

This thesis has been submitted to St. Mary's University, School of Graduate Studies for examination with my approval as a university advisor.

Matewos Ensermu (PhD)

Advisor

Signature & Date

Table of contents

Acknowledgement.....	iii
List of Abbreviations and Acronyms.....	iv
List of figures.....	v
List of Tables.....	v
Abstract.....	vi
CHAPTER I: INTRODUCTION.....	1
1.1. Background of the study.....	1
1.2. Background of the company.....	3
1.3. Statement of the problem.....	4
1.4. Objective of the study.....	5
1.5. Significance of the study.....	6
1.6. Definition of terms.....	6
1.7. Scope of the Study.....	7
1.8. Organization of the study.....	7
CHAPTER II: LITRATURE REVIEW.....	9
2.1. Theoretical Literature.....	9
2.2. Performance Measures in Supply Chain.....	14
2.3. PMS.....	16
2.4. SCOR model.....	16
CHAPTER III: RESEARCH METHODOLOGY.....	19
3.1. Research study area.....	19
3.2. Research design.....	19
3.3. Sample size and Sampling techniques.....	20
3.4. Method of data collection.....	21

3.5. Data processing / analysis.....	21
3.6. Framework development.....	22
3.7. Ethical consideration	23
CHAPTER IV: DATA ANALYSIS AND FINDINGS	24
4.1. Data analysis.....	24
4.2. Discussion.....	32
4.2.1. Planning performance	32
4.2.2. Sourcing performance	33
4.2.3. Delivery performance.....	35
4.3. Summary of findings.....	36
CHAPTER V: CONCLUSIONS AND RECOMMENDATIONS.....	38
5.1. Conclusions.....	38
5.2. Limitation of the study	39
5.3. Recommendations	39
References	41
Appendix.....	43
Interview questions.....	44
Questioner.....	49
Declaration	
Endorsement	

Acknowledgement

First and foremost, the lord our God, the almighty lord of hosts and of the world, glory to be to him for his eternal support and cherish. My supportive Supervisor, Matiwos Ensermu deserves my special thanks for everything especially for his commitment to share everything that he has with me. Those employees, who didn't hesitate to fill up the questionnaire in spite of their busy schedule and work time deserve a special mention here without whose contribution and cooperation, Friends and families who support in my whole career development.

Thanks All!!!

Afera M.

List of Abbreviations and Acronyms

ERP	Enterprise Resource Planning
SCM	Supply Chain Management
SLA	Service Level Agreement
OLA	Organizational Level Agreement
SCOR	Supply Chain Operation Reference
ERCA	Ethiopian Revenue Custom Authority
EAL	Ethiopian Airlines
PMS	Performance Management Systems
BSC	Balanced Scorecard
ABC	Activity Based Costing
DRP	Distribution Requirements Planning
OD	Overall delivery performance
OS	Overall sourcing performance
OP	Overall planning performance
OSP	Overall internal supply chain performance

List of figures

Supply chain flow.....19
Internal supply chain measurement framework.....27
Work experience.....31

List of Tables

General Information.....23
Reliability analysis.....25
Planning performance.....27
Sourcing performance.....29
Delivery performance.....31
Correlations.....32

Abstract

The purpose of the paper is to analyze the internal supply chain performance of ethio telecom, with specific reference of the supply chain operation reference model. Quantitative, survey based research was carried out with in supply chain department of Ethio telecom. In addition the study was dedicated to look over the relationship between plan, source and deliver with the overall performance of the company. Empirical results indicate a strong and positive statistical relationship between supply chain performance and three processes of SCOR model. The study indicates unsatisfactory internal supply chain performance of ethio telecom. Finally the researcher suggest ethio telecom to owe standardized framework to measure its supply chain performance and the researcher developed the framework presented herein, in hopes that it would stimulate more interest in this important area.

CHAPTER I

INTRODUCTION

1.1. Background of the study

In a highly competitive market, all organizations strive to improve their product quality, to reduce their product and service cost, and to shorten their product delivery and response time to the market. With the emergence of a new business partnership and the information revolution, “Supply Chain Management” concept is made possible as a conventional management tool (Mohammad Ali¹, 2012). To search for the better answer of satisfying customer demands in the face of fierce global competition, companies have experienced dramatic changes in the way they operate. For more than a decade, companies have reengineered and restructured in an effort to improve efficiency and meet customer expectations. The goal is to develop value-added processes that deliver innovative, high-quality, low-cost products on time with shorter development cycles and greater responsiveness, to supply a quality product to customers at an affordable cost and to increase the profit margin for investors and shareholders. Development of cross-functional teams aligns organizations with process oriented structure, which is much needed to realize a smooth flow of resources in a supply chain, such teams promote improved supply chain effectiveness, and such teams promote improved supply chain effectiveness (Trent and Monczka 1994). Supply Chain Management is key for achieving sustainable business results, According to Deloitte research, best companies are 50%-100% more productive enjoying a 5%-10% cost advantage compared to competition. (<http://www.deloitte.com> as of 10/12/2013)

The supply chain management has been accepted as an alternative to meet the stated goals and to improve the competitive power. SCM became a general and strategic concept of dealing with efficient logistics and network collaboration with business partners. The concept of supply chain management (SCM), according to Thomas and Griffin (1996) represents the most advanced state in the evolutionary development of purchasing, procurement and other supply chain activities.

A supply chain may be defined as an integrated process wherein a number of various business entities (i.e., suppliers, manufacturers, distributors, and retailers) work together in an effort to: (1) acquire raw materials, (2) convert these raw materials into specified final products, and (3)

deliver these final products to retailers (Seruga2, 2011). This chain is traditionally characterized by a forward flow of materials and a backward flow of information. For years, researchers and practitioners have primarily investigated the various processes of the supply chain individually. Recently, however, there has been increasing attention placed on the performance, design, and analysis of the supply chain as a whole.

Internal supply chain refers to the chain of activities or functions within a company that results in providing a product/service to the customer. Integration of these functions involves the holistic performance of activities across departmental boundaries. (Basnet, 2013)

The central roles of these internal supply chain performance measurement systems are highlighted by Chen (2006) as measuring the performance of business processes, measuring the effects of the companies' strategies and plans, diagnosing of problems, supporting decision-making, motivating improvements and supporting communication within a company.

Ethio telecom internal Supply chain management includes many tasks today such as purchasing, payment flow, material handling, production planning and control logistics and warehousing, inventory control and distribution and delivery by using ERP software.

This study is designed to analyze the internal supply chain performance of ethio telecom, and to develop a framework that supports effective management of ethio telecom supply chains which can be viewed as an alternative to improve supply chain performance of the company. Developing an efficient supply chain does not only help companies reduce costs but also deliver better services to the customers while maintaining the quality of the products with the global standard. In order to fulfill research objective, the KPI's of SCOR (supply chain operation reference) model will be employed with the identification of key performance indicators (KPI/Metrics) of telecom companies supply chains. The aim of SCOR is to provide a standard way to measure Supply chain performance and to use common metrics to benchmark against other organizations according to (Christopher, 1998).

The toolbox of the SCOR-Model also offers predefined KPI-metrics for performance measurement. In general, such an analysis enables best practice companies to understand the value contribution of each internal and external business process involved, as well as their value tradeoffs systematically.

1.2. Background of the company

The introduction of telecommunication in Ethiopia dates back to 1884. Ethiopian Telecommunication Corporation is the oldest public telecommunications operator in Africa. In those years, the technological scheme contributed to the integration of the Ethiopian society when the extensive open wire line system was laid out linking the capital with all the important administrative cities of the country. After the end of the war against Italy, during which telecommunication network was destroyed, Ethiopia re-organized the telephone, telegraph and postal services in 1941 (Company Profile, 2010).

According to same cite, originally a division of the Ministry of Post, Telephone and Telegraph, what would become the ETC was established as the Imperial Board of Telecommunications of Ethiopia (IBTE) by proclamation No. 131/52 in 1952. Under the DERG Regime, the IBTE was reorganized as the Ethiopian Telecommunications Service on October 1975, which was in turn reorganized on January 1981 as the Ethiopian Telecommunications Authority. On November 1996, the Ethiopian Telecommunications Authority became ETC by Council of Ministers regulation No. 10/1996. The subsequent Proclamation 49/1996 expanded the ETC's duties and responsibilities. For its international traffic links and communication services, ETC mainly uses its earth station at Sululta which transmits and receives to both Indian Ocean and the Atlantic Ocean satellites.

In late 2006, the ETC signed an agreement worth US\$1.5 billion with three Chinese companies, ZTE Corporation, Huawei Technologies and the Chinese International Telecommunication Construction Corporation, to upgrade and expand Ethiopian telecommunications services. This agreement increases the number of mobile services from 1.5 million to 7 million, land line telephone services from 1 million to 4 million, and expansion of the fiber optic network, from the 4,000 kilometers to 10,000 by 2010. It is part of a larger US\$ 2.4 billion plan by the Ethiopian government to

France Telecom (Orange), the French telecom company, had taken over the management of the Country's sole telecom provider, Ethiopian Telecommunications Corporation, as of December 2, 2011 up to December 1, 2013. Orange was managed ethio telecom for two years before

leaving the job back to Ethiopians. Ethio-telecom has 12 divisions. These divisions are namely; finance, legal, human resource, sourcing and facilities, residential marketing and sales, customer services, enterprises, internal audit, Program Management Office/security/public relation, quality and process, information system, and network divisions. Each division has its own chief officer.

Ethio telecom's network coverage and type of services rendered are increasing from time to time. The same is true for its revenue. The annual gross profit growth rate is showing an increase from year to year.

Procurement, material planning, material shipping and warehousing had been undertaken in the former ETC from the introduction up to now. However, managing these activities in an organized supply chain is very recent history; not more than 7 years. In the last five years ethio telecom extends its effort in to more organized supply chain and implement ERP system. The main objective this study is to analyze the implemented supply chain performance using SCOR model three processes that are appropriate for ethio telecom internal supply chain.

1.3. Statement of the problem

In the present day business is ridiculous without telecommunication technologies and this technology is highly hot-blooded to change in a short period of time. Unless and otherwise applying efficient and effective supply chain companies like ethio telecom may simply failed to go hand in hand with this rapidly changing environment. Because this highly changing environment telecom companies including ethio telecom demands efficient and continuously improving supply chain now than ever.

Ethio telecom had tried to organize its supply chain using ERP (enterprise resource planning) system. However the performance had never been analyzed and measured using scientific measurement. "You cannot improve what you cannot measure" (Wisner, 2005).

By today ethio telecom is actively promoting the further modernization and expansion of the telecom infrastructure for instance ethio telecom sign 1.6 billion USD vendor financing agreement with two china telecom companies. This mega project will come up with huge inventories of different telecommunication equipment. The current project and the overall

operation demands high level of efficiency of internal supply chain. However, the company's internal supply chain is not believed at this level of maturity. After transformation ethio telecom strongly working to integrate its functional departments and it is supposed that there is slight improvement. When reengineering was made on the supply chain the aim was to increase the supply chain management efficiency. However, there is a gap between what was expected and what is actually at hand. To narrow-down this gap the company must improve its supply chain efficiency in sustainable manner. To do so, first the level of performance should be measured well.

Even if the company implement ERP system to integrate the performance of planning, sourcing, delivering and returning commercial, network and stationery materials is still inefficient. Because of improper planning user departments couldn't find materials. There is a tendency of improper material utilization and in accurate forecasting

The supply chain department is responsible to source materials from external and internal suppliers. sourcing performance still remains with high procurement cost and difficulty of sourcing materials as per the specification. In addition ethio telecom facing with the problem of on time shipment and quality at delivery.

To improve the supply chain performance of the company, there should be a standardized framework to measure its internal supply chain that is believed to be appropriate to the company by company's experts of in the area.

1.4. Objective of the study

The main objective of this study were to analyze the internal supply chain performance of Ethio telecom by using three processes of SCOR model. More specifically, to attain the following objectives:

- ✓ To develop a framework for facilitation of the standard supply chain performance analysis telecom company.
- ✓ Using the frame work the following questions were be addressed:
 - How is the supply chain efficiency of the company in **planning** commercial, network and stationery items?

- How is the supply chain efficiency of the company in **sourcing** commercial, network and stationery items?
- How is the supply chain efficiency of the company in **delivering** commercial, network and stationery items?
- How the above three processes impacts the overall supply chain efficiency?

1.5. Significance of the study

Given the extreme competition in the global industry, measuring and integrating their supply chain became essential for organizations in order to succeed, to gain maintainable very competitive advantage. To do so the material and information flow efficiency among functional business units in the company must be analyzed. This study were tried to play an important role in analyzing the supply chain performance of ethio telecom. At the end, the researcher were designed standardized framework to measure its internal supply chain that is believed to be appropriate to the company by company's experts of in the area. Aframework that intiate the company's experts to improve it for the better use of the company. Furthermore the researcher tried to locate the level of performance of the copany to enable the company to have information where they are.

1.6. Definition of terms

Supply chain: A supply chain is broadly defined as all of the linked individual organizations that, by direct or indirect means, lead to the delivery of a service or a good to a customer (Meindl, 2004).

Supply chain management: SCM is defined as the integration of key business processes from end user through original suppliers that provide products, services, and information and hence add value for customers and other stakeholders (Lambert, 1998).

Internal supply chain: refers to the chain of activities or functions within a company that results in providing a product to the customer. Integration of these functions involves the holistic performance of activities across departmental boundaries. (Basnet, 2013)

Supply chain performance: the performance of the various processes included within the firm's supply chain function.

Ethio telecom: sole telecommunication company in Ethiopia.

Commercial items: refers to category of materials including Voucher card, SIM card, EVDO, Mobile apparatus etc.

Network Items: refers to category of materials including Cables, ADSL modems, Aironet devices, Network card etc.

Stationery items: refers to category of materials including Paper, pen, etc.

ERP systems: are the software infrastructure that facilitates the flow of information between all functions in a company (e.g., manufacturing, finance, HR, sales and marketing, logistics and procurement).

1.7. Scope of the Study

Supply Chain Management has a wide scope and includes a lot of theories about how to set up the chain. The thesis were not going into details regarding everything included in the term Supply Chain Management. The aim for this study were only to analyze the internal supply chain performance and give a view of methods that can be used to evaluate if internal supply chain is efficient or not through adopting SCOR model three processes out of five.

1.8. Organization of the study

This study shall be categorized in five chapters. The first chapter shows the general background of the study, business facts of the organization, defining the research problem, objective, significance, and scope of the study. Then the second chapter is followed which reviews both theoretical framework and empirical literatures related to the area. The third chapter shall talk about research methodology that the researcher were used. Followed by this the fourth chapter which the data analysis and findings shall done. And the final chapter which is chapter five contain conclusions and possible recommendation.

CHAPTER II

LITRATURE REVIEW

2.1. Theoretical Literature

A competitive firm has to have the ability to acquire the goods and services it needs just when and where it needs them, at a favorable price, and with acceptable payment and delivery terms. A competitive firm needs to directly manage the flow of goods through its distribution networks in a cost-effective manner (Chen, 2004).

Effective supply chain management (SCM) has become a potentially valuable way of securing competitive advantage and improving organizational performance since competition is no longer between organizations, but among supply chains. Baharanchi (2009) discuss integration would enable the value creation and transfer process, right from the supplier to the end customer to operate as a seamless chain along which information, knowledge, equipment and physical assets flow as if water. Seamless flow of physical and non-physical assets amongst companies would lead to pooling synergy and optimization of tangible and intangible assets that could possibly led to gain competitive advantage. According to Suhong et al. (2004), the findings of their research on the impact of supply chain management practices on competitive advantage and organizational performance indicate that higher levels of SCM practice can lead to enhanced competitive advantage and improved organizational performance.

A supply chain is broadly defined as all of the linked individual organizations that, by direct or indirect means, lead to the delivery of a service or a good to a customer (Meindl, 2004). A supply chain may be defined as an integrated process wherein a number of various business entities (i.e., suppliers, manufacturers, distributors, and retailers) work together in an effort to: (1) acquire raw materials, (2) convert these raw materials into specified final products, and (3) deliver these final products to retailers. (Beamon, 1998)

SCM is defined as the integration of key business processes from end user through original suppliers that provide products, services, and information and hence add value for customers and other stakeholders (Lambert, 1998). The concepts of supply chain design and

management have become a popular business paradigm in these days. Supply chain management emphasizes the overall and long-term benefit of all parties on the chain through co-operation and information sharing. This signifies the importance of communication and the application of IT in SCM. Information sharing between members of a supply chain using EDI technology should be increased to reduce uncertainty and enhance shipment performance of suppliers and greatly improve the performance of the supply chain system (Srinivasan, 1994).

Supply chain management refers to a situation where the buyer (or the buyer and its suppliers jointly) proactively seeks to drive performance improvement in value for money throughout the totality of a supply chain (Andrew cox, 2003).

In a supply chain world, suppliers, finished goods producers, service providers, and retailers are required to create and deliver the best products and services possible. Collaboration enables a company to do exceptionally well a few things for which it has unique advantages. Other activities are shifted to channel members that possess superior capabilities. However, there are several underlying themes. Outstanding supply chain companies stay customer-centric, focus on process management, invest in IT as a capability enabler, and are obsessed with performance measurement. Supply chain management is the collaborative design and management of seamless value-added processes to meet the real needs of the end customer. The development and integration of people and technological resources as well as the coordinated management of materials, information and financial flows are critical to successful supply chain integration. The primary of SCM is to establish unique value-added processes that satisfy customers better and more efficiently than the competition. Managing outstanding processes across functional and organizational boundaries require dramatic and often painful changes in both thinking and behavior.

In the supply chain literature, attempts to define supply chain performance have been rare. Srinivasan (2011) defined supply chain performance for a firm as the performance of the various processes included within the firm's supply chain function.

Performance measurement (as promoted in the literature and practised in leading companies) refers to the use of a multi-dimensional set of performance measures. The set of measures is

multi-dimensional as it includes both financial and non-financial measures, it includes both internal and external measures of performance and it often includes both measures which quantify what has been achieved as well as measures which are used to help predict the future.(Neely,2003)

Performance measurement cannot be done in isolation. Performance measurement is only relevant within a reference framework against which the efficiency and effectiveness of action can be judged. In the past, performance measurement has been criticized for judging performance against the wrong frame of reference and now there is widespread support for the belief that performance measures should be developed from strategy. Performance measurement has an impact on the environment in which it operates. Starting to measure, deciding what to measure, how to measure and what the targets will be, are all acts which influence individuals and groups within the organization. Once measurement has started, the performance review will have consequences, as will the actions agreed upon as a result of that review. Performance measurement, is therefore, an integral part of the management planning and control system of the organization being measured. Performance measurement is now being used to assess the impact of actions on the stakeholders of the organization whose performance is being measured. Although this can be considered ‘as quantifying the efficiency and effectiveness of action’, in the case of measuring the impact of the organization’s performance on customer satisfaction, it is not as obvious in the cases of measuring the impact of the Organization’s actions and performance on employee satisfaction or local community satisfaction. (Neely, 2003)

Studies have investigated supply chain performance in several dimensions and perspectives. It is evident that as a supply chain is a network of several organizations; hence working in collaboration is essential for optimal performance. There are several constituents that affect the collaboration potential of a supply chain and any unmeasured changes in these can have adverse effects on performance. This evolution of PMS illustrates the shift to the long-term approach of innovative PMS over the short-term, traditional PMS. In this sense, companies are becoming more aware that value means much more than cost efficiency and being profit oriented. Moreover, evaluating performance on only financial indicators points to results and

does not consider its determinants, providing a myopic approach for long-term results. (McCormack, 2008)

Within the recent developments of performance measurement systems, mainly related to the processes in the supply chain, supply chain operation reference model (SCOR) has gained increasing visibility in business and academic communities as an approach, which moves toward innovative PMS. By offering a standardize way of viewing the supply chain, the SCOR model has also contributed to the development and evolution of different supply chain maturity models which take an innovative PMS perspective. (McCormack, 2008)

The traditional supply chain was normally driven by manufacturers who managed and controlled the pace at which products were developed, manufactured and distributed (Stewart, 1997). Generally, the efficiency is measured by taking the ratio of revenue over the total supply chain operational costs. However, in recent years, new trends have emerged in the efficiency measurement, where, customers have increasing demands on manufacturers for quick order fulfillment and fast delivery. This has made the supply chain efficiency difficult to be measured (Stewart, 1997). In addition to the usual financial measures, the supply chain performance needs to take into consideration other specific indicators such as the delivery rate and percentage of order fulfillment. This measurement is further complicated by the influence of manufacturing capacity and other influential operational constraints. In view of the increasing performance measures in supply chain, not many companies will know how to gauge the performance of their supply chain.

Companies thereby need to continuously improve their processes by redesigning processes and products, by sharing knowledge between the supply chain partners, by continuously improving the information flows, and by exploring new threats or substitutes affecting the value delivered to the customer (Brewer & Speh, 2000). To do so the performance should be analyzed and measured.

Lambert and Pohlen (2001) state that in most cases articles about supply chain metrics mainly consider internal logistics performance measures. In order to understand the problems and challenges of performance measurement in supply chains it is therefore significant to separate

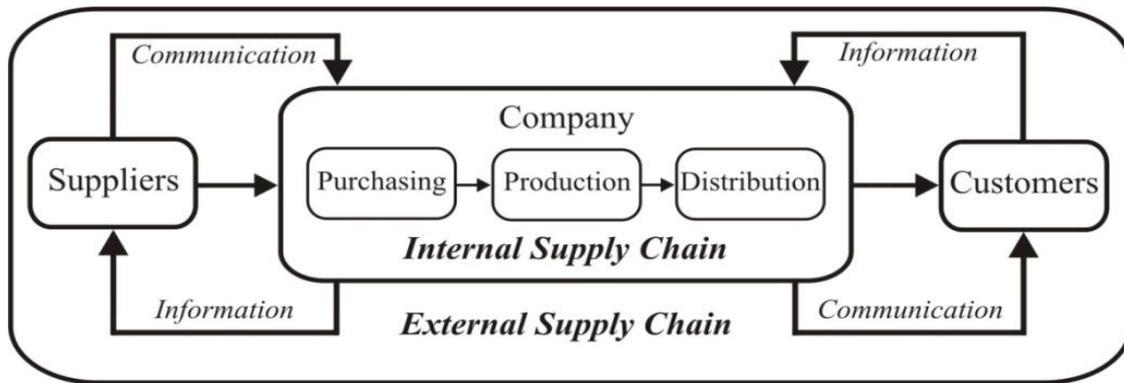
internal and external performance measurement. The internal performance measurement mainly focuses on the value chain or logistics supply chain within a single company with its operational functions sourcing, inbound storage/transportation, operations, outbound storage/transportation and consumer distribution (Langley, 2003), while the external performance measurement has an emphasis on measuring the performance of the efficient and effective flows of material/products, services, information and financials from the supplier's supplier through various organizations/ companies out to the customer's customer (Coyle et al., 2003). In the current research an attempt was made to evaluate the internal supply chain performance of ethio telecom.

Internal supply chain refers to the chain of activities or functions within a company that results in providing a product to the customer. Integration of these functions involves the holistic performance of activities across departmental boundaries. (Basnet, 2013).according to (Mohammed, 2008) internal supply chain concerned with the flow of goods. This includes transportation, Warehousing and storage, inventory management, packaging and returns good handling.

The central roles of these internal supply chain performance measurement systems are highlighted by Chan (2006) as measuring the performance of business processes, measuring the effects of the companies' strategies and plans, diagnosing of problems, supporting decision-making, motivating improvements and supporting communication within a company.

Furthermore, Chan (2006) criticized such traditional roles of performance measurement as short-term and finance oriented, lacking strategic relevance, strong internal focus, avoiding overall improvements, inconsistent measures and the quantification of performance in numbers.

Fig 2.1. Supply chain Flow



Source: <http://www.ibimapublishing.com/journals/15/11/2013>

In an effort to improve internal supply chain performance organizations used different information technology based systems like enterprise resource planning/ERP/. ERP (Enterprise Resource Planning) software is the internal technological hub of the organization. It is used to support existing business strategies and provides the company with the flexibility required to improve customer responsiveness (the demand-side) and to better manage production needs, inventory and the procurement of inputs (the supply-side). It is also the ultimate tool for allocating scarce resources. Using ERP, a company can create a new information foundation (that is organized, consistent, codified and standardized) by replacing the existing diverse legacy systems. Essentially, ERP systems are the software infrastructure that facilitates the flow of information between all functions in a company (e.g., manufacturing, finance, HR, sales and marketing, logistics and procurement). (Andrew cox, 2003).

2.2. Performance Measures in Supply Chain

Last few decades has seen an increasing stress on obtaining optimal performance in the supply chain regime. In this context, managing supply chain operations effectively and efficiently has served for the success of firms. Accordingly, the importance of various supply chain performance metrics has been repeatedly underscored. All these have formed the platform to establish appropriate measure of supply chain performance has long been highlighted. The analysis of literature in the area of supply chain performance shows that

different researchers have presented different metrics and measures to capture supply chain performance. However, there has been no consensus on measuring supply chain performance and each measure has its own benefits and drawbacks. In recent times, researchers have attempted to respond to these limitations by designing systemic and balanced performance measurements systems.

In the realm of performance measures, few attempts have been made to systematically classify the measures for evaluating the performance of supply chains. Moreover, there is disagreement over the most appropriate way to categorize them. For example, they have been grouped according to: Whether they are qualitative or quantitative. What they measure: cost and non-cost (Mandal, 2012)

Thus there exists great ambiguity among decision makers and practitioners regarding the usage of performance metrics in supply chain performance evaluation. To address this problem, some researchers have used Balanced Scorecard (BSC) and Activity Based Costing (ABC) methods to evaluate supply chain performance (Liberatore, 1998). Other researchers have also proposed similar balanced frameworks, such as Performance Measurement Matrix, results-determinants framework, performance pyramid, etc.(Neely,2005).

Perhaps the most well-known of these is the supply chain operations reference (SCOR) model alluded to earlier. This was developed by the Supply Chain Council in 1997 and has been described as a “systematic approach for identifying, evaluating and monitoring supply chain performance” (Stephens, 2001). It rests on the principle that a balanced approach is crucial; single indicators (e.g. cost or time) cannot be adequately taken to measure supply chain performance, which must be measured at multiple levels(Shepherd & Gunter,2006). The SCOR model is a business process reference model. It provides a framework that includes SC business processes, performance metrics, best practices, and people features. In the SCOR model the metrics are linked with five management processes: plan, source, make, deliver, and return. (Supply-Chain Council 2010).

Performance measurement provides information for management and decision makers, enable identifying the success and potential of management strategies and facilitating the

understanding of the situation. In addition performance measurement assists in directing management attention, revising company goals, and re-engineering business processes. SC performance measurement is helpful in the continuous improvement of SCM. (Chan 2003)

2.3. Performance measurement systems (PMS)

Performance measurement systems are evolving from a system based on measurement and cost control, referred to as traditional PMS, to a system based on the measurement and creation of value using non-cost performance measures, those that are not economic or explicitly financial, referred to as innovative PMS (De Toni and Tonchia, 2001). Table I highlights examples of these two approaches.

This evolution of PMS illustrates the shift to the long-term approach of innovative PMS over the short-term, traditional PMS. In this sense, companies are becoming more aware that value means much more than cost efficiency and being profit oriented. Moreover, evaluating performance on only financial indicators points to results and does not consider its determinants, providing a myopic approach for long-term results.

Within the recent developments of performance measurement systems, mainly related to the processes in the supply chain, supply chain operation reference model (SCOR) has gained increasing visibility in business and academic communities as an approach, which moves toward innovative PMS. By offering a standardize way of viewing the supply chain, the SCOR model has also contributed to the

2.4. SCOR model

Even if there are plenty of models used to measure supply chain performance to meet the objective of this research were to analyze the supply chain performance of ethio telecom using planning, sourcing and delivery processes from SCOR model were used.

In 1996 the Supply Chain Council defined the Supply Chain operation Reference (SCOR) model, defining five processes: Plan, Source, Make, Deliver and return that operated in three channels Suppliers, firm and customers (Ronald, Stephan & Ashok, 2000). The SCOR Model

is used as a supply chain improvement tool by notable successful firms such as Intel, IBM, & 3M (Wisner et al., 2005). Poluha (2007) details the five processes of the SCOR Method:

Plan: processes that adjust the expected resource need to the expected demand conditions.

Source: Processes that procure goods and service to meet planned or actual demand.

Make: processes that transform product to a finished state to meet planned or actual.

Deliver: processes that provide finished goods/services to meet planned or actual demand, typically including order management, transportation management and distribution management.

Return: Processes associated with returning or receiving returned products for any reason. These processes extend into post-delivery customer support.

In an integrated supply chain, coordination of logistical activities is effectively extended to encompass source, make and deliver processes in collaboration with channel partners. Intrafirm coordination of sourcing, production and logistics activities enhances the ability to respond to market volatility by eliminating redundant activities and reducing response time by facilitating seamless flow of demand information, supply of materials and finished goods (Rao, 2010).

The Plan processes describe the planning activities associated with operating a supply chain. This includes gathering customer requirements, collecting information on available resources, and balancing requirements and resources to determine planned capabilities and resource gaps. This is followed by identifying the actions required to correct any gaps. (Supply chain council, 2010). To measure the planning performance of the internal supply chain performance order lead time, material utilization, order entry method and accuracy of forecasting measures were used.

The Source processes describe the ordering (or scheduling) and receipt of goods and services. The Source process includes issuing purchase orders, scheduling deliveries, receiving, shipment validation and storage, and accepting supplier invoices. (Supply chain

council, 2010). Sourcing is the entire set of business processes required to purchase goods and services. To measure inward material quality, quantity and timely delivery, procurement cost, material inventory level, vendor development capability, defect rate and suppliers pricing were used as metrics to analyze sourcing performance.

The Deliver processes describe the activities associated with the creation, maintenance, and fulfillment of customer orders. It includes the receipt, validation, and creation of customer orders; scheduling order delivery; pick, pack, and shipment; and invoicing the customer. (Supply chain council, 2010). In this particular study to analyze delivery performance different metric including onetime shipment, order fulfillment, number of delivery faults, quality at delivery, transit time, effectiveness of delivery invoicing and total distribution cost.

CHAPTER III

RESEARCH METHODOLOGY

3.1. Research study area

This study was conducted in the sole telecommunication company of Ethiopia, ethio telecom. The researcher had been distributing 118 questioners to corporate, zonal and regional supply chain experts of ethio telecom and interview with managers and supervisors in the study area. This were help the researcher to identify which metrics are really measures telecom companies. There are several metrics in the literature and in business organizations recommended for use in measuring the performance of a supply chain management (Gunasekaran and Kobu, 2007). By compiling taxonomy of metrics from the articles I had download and recent books concerned with performance measurement in supply chains. The measures were then categorized according to their applicability to the three supply chain processes defined in the supply chain operations reference (SCOR) model (plan, source, and deliver)

3.2. Research design

A qualitative research offers the opportunity to carefully communicate with and capture the experience of the interviewed participants or managers and supervisors. The qualitative method helps the researcher to understand the meaning of situation, event, experiences, and actions of participants (Maxwell, 2005) while a quantitative research requires standardized measures and is often expressed in form of numbers to verify and test facts.

To attain the objective of this study both of the methods were employed. Descriptive study design had been used to analyze performance of ethio telecom internal supply chain using selected key performance indicators from SCOR model. Qualitative study were employed to explain interview results that were collected from managers and supervisors.

3.3. Sample size and Sampling techniques

In principle, accurate information about given population could be obtained only from census study. However, due to time and financial constraint, in many cases, a complete coverage of population is not possible; thus sampling is one of the methods, which allow the researcher to study relatively small number of units representing the whole population (Sartnakos, 1998). Out of 168 staff in the study area questioner were distributed to 118 of them randomly. In addition to the questioner 6 supervisors and 3 managers were be interviewed. A total of 104 responses were received, of which 95 were substantially complete, which represents a response rate of 80.5 percent. The responses were received over a three-week period in December 2013 and were submitted electronically in to SPSS.

In determining the sample the researcher were used sample size determination formula which was used by Glen D in 2009(<http://www.webcitation.org> at 11/12/13).

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

Where:

- n is the sample size
- N is the population size
- e is the level of precision

$$n = 168 / (1 + 168(0.05)^2)$$

$$= 118$$

No	Level of occupation	Total population	Sample size
1	Staff	168	118
2	Supervisors	16	6
3	Managers	9	3

3.4.Method of data collection

To gather necessary data that are relevant for maintaining the stated objective both primary and secondary data were used. Secondary data were collected from studies conducted and information documented in the company's supply chain working manual, issuing reports, receiving reports, material requisitions and packing slip. These documents help the researcher to have more information in addition to the information collected through primary data collection methods.

Primary data had been collected through questioners via email and personal contact with supply chain experts of the company and Semi structured interview were employed to collect primary data from managers and supervisors in the area.

3.5.Data processing / analysis

Raw data collected using questioner were organized and data verification were carried out after the field data collection completed. And concerning the processing software issues SPSS were used to analyze.

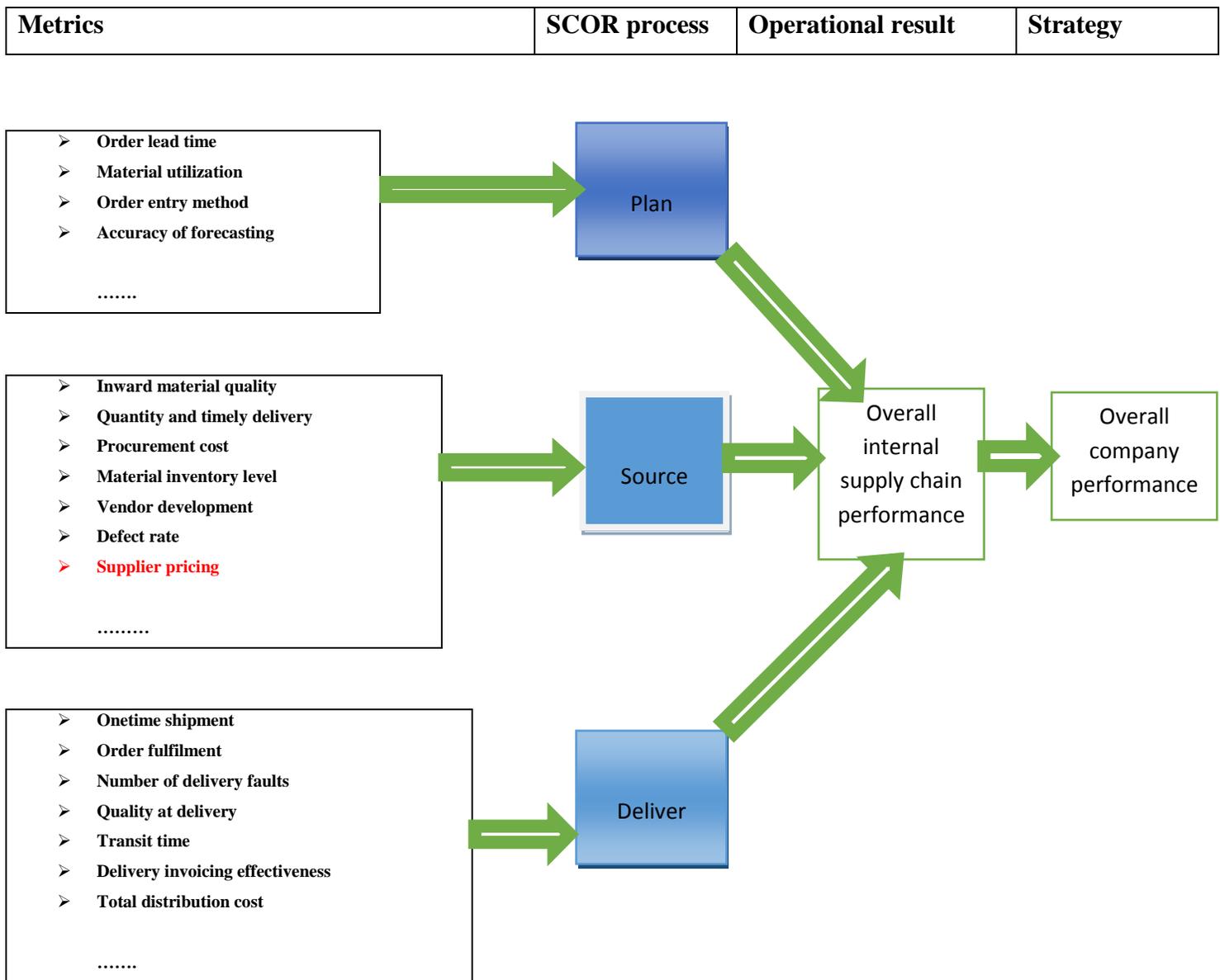
The data collected from ethio telecom employees, supervisors and managers through primary and secondary data collection methods were thoroughly verified by the researcher. Then after coding the collected data through questioner were done with the help of the software called SPSS (statistical package for social science).

The data were analyzed based on the type of question that were asked by the researcher and type of data demanded. Accordingly different statistical techniques were used incorporating descriptive statistics which includes frequencies, percentages etc. in addition Pearson's correlation coefficients had been used to show the relationship between SCOR processes and overall supply chain performance.

3.6. Framework development

In this particular study of internal supply chain performance only three variables were used in the analysis out of five processes; plan, source and deliver. This is because there is no any network, commercial and stationery material manufactured in ethio telecom. The assumed relationship among the three processes and overall supply chain performance is shown in the following framework.

Fig 3.1 Internal supply chain performance measurement frame work



Source: imagined by the researcher

3.7. Ethical consideration

Informed consent is the major ethical issue in conducting research. According to Armiger. “It means that a person knowingly, voluntarily and intelligently and in a clear and manifest way gives his/her consent”.

Accordingly, respondents were assured that the information they provide is confidential and used for exclusively for academic purpose. In addition statements conform the prohibition incorporating any identity details or personal references in the questioner. This helps the researcher to collect bias free response and allow respondents a room for express their idea with full of freedom. Much effort were made to keep the response confidential and would not be used for any personal interest. Generally the whole process of the research was controlled to be within acceptable professional ethics.

CHAPTER IV

DATA ANALYSIS AND FINDINGS

4.1. Data analysis

In this part of the research, the data that were collected using interview, questioner and document review are presented and an attempt is made to show the results and findings of the study according to relevant issues and as per the objective set above. The data had played very important role in analyzing the internal supply chain performance of ethio telecom. Questioner were used to gather data form supply chain experts of the company and the interview were employed to collect information from supervisors and managers regarding appropriateness of measures and their suggestion about SCOR variables. Further document assessment was made to investigate the performance.

4.1.1. General information of respondents

As depicted in table I below out of 95 respondents 29.5 percent of the respondents were female respondents and the remaining 70.5 percent were male respondents. In this study respondents from different working titles were participated i.e. out of 95 respondents 21 were Logistic administrators, 5 were Procurement administrator, 25 were procurement and supplier relation administrator and the remaining 44 respondents were belongs to the working title supply chain administrator. Regarding educational background, a great majority of these respondents hold their first degree which accounts for 75 percent, 25 percent of the respondents were Second degree holders. Regarding their qualification the 100 percent of the respondents are being working as professional supply chain experts.

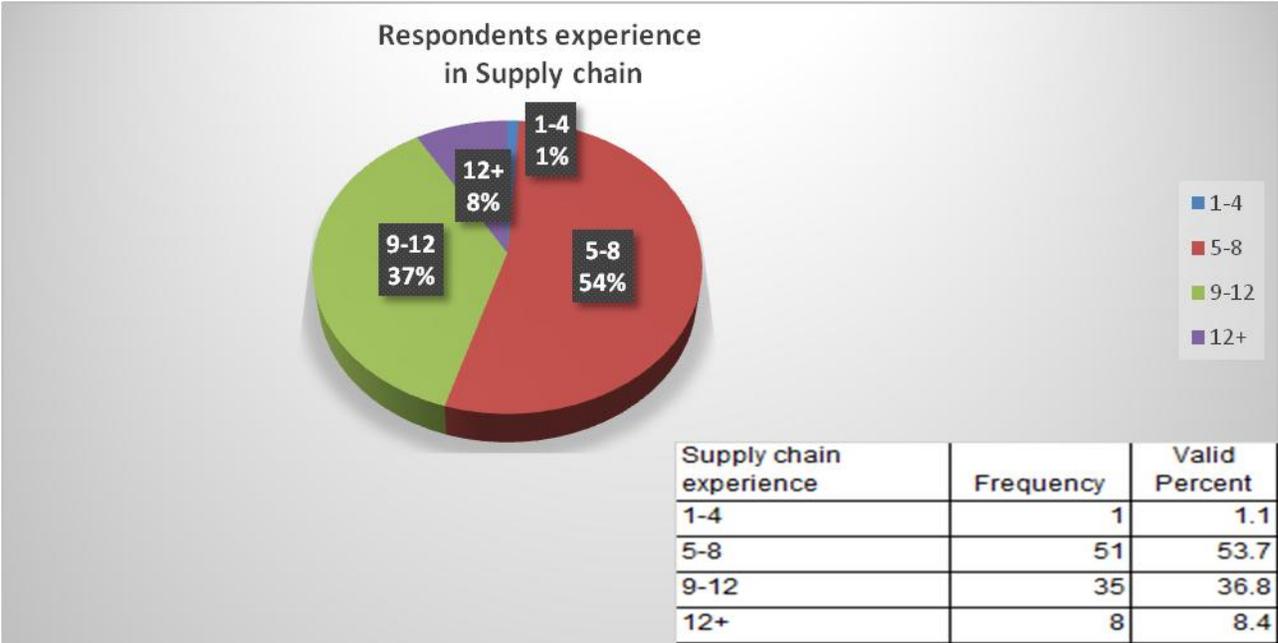
Table 4.1 General information of respondents

Table I General information of sample respondents			
General Information of respondents		Number	Percentage
Education	Diploma	0	0
	Degree	75	78.9
	Masters	20	21.1
	PhD	0	0
	Other	0	0
Gender	Male	67	70.5
	Female	28	29.5
Position	Clerical	0	0.0
	Professional	95	100.0
Title	Logistic Admin	21	22.1
	Procurement Admin I	0	0.0
	Procurement Admin II	5	5.3
	Procurement and supplier relation admin	25	26.3
	Supply chain Admin	44	46.3

Source* SPSS research data

When we have a look at the work experience in the study area, 1 percent of the respondents had been serving their organization in this area for 1-4 years, 53 percent of the respondents had been serving their organization for 5-8 years, 37 percent of the respondents were serving their organization for 9-12 years and the remaining serving for above 12 years. As indicated in the statistics most of the respondents which accounts for 99% were pretty much experienced they had been serving their organization in the supply chain area for more than 5 years. Their long experience in the area was playing an in important role in in responding questions that had been asked to analyzing the internal supply chain performance of the company.

Figure 4.1 Supply chain working experience



Source* SPSS research data

4.1.2. Reliability analysis

Reliability is essentially the dependability of an instrument to test what it was designed to test. The appropriate test for reliability is inter-item consistency reliability which is popularly known as the Cronbach's coefficient alpha which is used for multi-point-scaled items. The internal consistency can be considered to be satisfactory for all factors (Cronbach Alpha; $\alpha > .7$). All eighteen variables have internal consistency

Table 4.2 reliability analysis

Reliability Statistics	
Cronbach's Alpha	N of Items
.826	18

Item-Total Statistics

No	Variables	Cronbach's Alpha
1	Inward Material Quality	.808
2	Quantity and Timely Delivery	.814
3	Procurement Cost	.820
4	Material Inventory Level	.807
5	Vendor Development Capability	.821
6	Defect rate	.824
7	Suppliers pricing	.830
8	Order lead time	.819
9	Material Utilization	.815
10	Order entry Method	.815
11	Accuracy of forecasting	.816
12	On Time Shipment	.809
13	Order Fulfillment	.809
14	Number of delivery faults	.816
15	Quality at Delivery	.821
16	Transit time	.817
17	Effectiveness of delivery invoicing method	.826
18	Total distribution cost	.830

Source* SPSS research data

4.1.3. Planning performance result of questioner

Order lead lime includes request processing from user department, order confirmation by saying accepted or out of stock and shipment to the destination. 16.8 percent strongly disagree, 34.7 percent disagree, 25.3 percent neutral, 18.9 percent agree, and 4.2 percent of Respondents replayed strongly agree for the question *“Period between placing an order and receiving the ordered item from the vendor is short enough”*

As shown in the table 4.2 14.7 percent of sample respondents answered the strongly disagree material utilization efficiency, 34.7 percent agree, 28.4 percent neither, 15.8 percent agree and the remaining 6.3 percent of the respondents respond strongly agree for the question material utilization efficiency is efficient. 14.7 percent of respondents strongly disagree, 34.7 percent disagree 28.4 percent neither, 15.8 percent agree, 6.3 percent or respondents replay strongly agree for the question *“Order entry method speedy and accurate”*

“The forecasted consumption and actual consumption are approximately the same” only 13.7 percent of respondents reply agree, 17.9 percent strongly disagree, 51.6 percent disagree and the remaining 16.8 percent of respondents replied neither.

Table 4.3 Planning performance

	P1	P2	P3	P4
<i>Planning performance score from likert scale</i>	Percentage	Percentage	Percentage	Percentage
<i>Strongly disagree =</i>	16.8	12.6	14.7	17.9
<i>Disagree =</i>	34.7	44.2	34.7	51.6
<i>Neither =</i>	25.3	23.2	28.4	16.8
<i>Agree =</i>	18.9	15.8	15.8	13.7
<i>Strongly agree =</i>	4.2	4.2	6.3	0

Source* SPSS research data

- ❖ **P1 is Order lead time**
- ❖ **P2 is Material Utilization**
- ❖ **P3 is Order entry Method**
- ❖ **P4 is Accuracy of forecasting**

4.1.4. Sourcing performance questioner result

To analyze responses collected through questioner regarding the sourcing performance of the company likert scale were used. Accordingly, 2.1 percent of sample respondents replied strongly disagree, 31.6 percent replied disagree 29.5 percent neither, 26.3 percent agree and the remaining 10.3 percent of respondents replied strongly agree on best performance in ward material quality.

On the other hand 12.6 percent of respondents replied strongly disagree, 34.7 percent disagree, 11.6 neither, 38.9 agree, 2.1 strongly agree on quantity and timely delivery of commercial, network and stationery items. Regarding procurement 8.4 percent of respondents strongly disagree on the efficiency, 35.8 percent disagree, 17.9 percent neither, 15.8 percent agree and about 2.1 percent respond strongly agree.

The other metrics that had used to measure sourcing performance of the supply chain were Material inventory level. 26.3 percent of samples respondents were replied strongly disagree on material inventory level efficiency of the supply chain, other 21.1 percent disagree, 23.2 percent were neither and the remaining 29.5 present replayed agree. Concerning vender development capability 14.7 percent of respondents respond strongly disagree, 20percent of them disagree, 52.6 percent remain neutral and about 9.5 and 3.2 percent replayed agree and strongly disagree respectively.

Regarding defect rate, a measure used to analyses sourcing performance. 9.5 percent of respondents respond strongly disagree, 47.4 disagree, 22.1 remain neutral and 21.1 percent of the respondents replied agree on minimum defect rate. The last but not the list metrics in the sourcing performance were supplier pricing. About 14.7 percent of sample respondents strongly disagree on “**Suppliers set price that keeps the benefit of ethio telecom.** “, 44.2 percent disagree and 29.5 remains neutral.

Table 4.4 Sourcing performance

<i>Sourcing performance score from Likert scale</i>	S1	S2	S3	S4	S5	S6	S7
	Percentage						
<i>Strongly disagree =</i>	10.5	12.6	6.3	5.3	11.6	3.2	9.5
<i>Disagree =</i>	28.4	27.4	30.5	42.1	20	33.7	18.9
<i>Neither =</i>	34.7	24.2	28.4	17.9	29.5	24.2	38.9
<i>Agree =</i>	22.1	30.5	30.5	27.4	33.7	31.6	24.2
<i>Strongly agree =</i>	4.2	5.3	4.2	7.4	5.3	7.4	8.4

Source* SPSS research data

- ❖ **S1 is Inward Material Quality**
- ❖ **S2 is Quantity and Timely Delivery**
- ❖ **S3 is Procurement Cost**
- ❖ **S4 is Material Inventory Level**
- ❖ **S5 is Vendor Development Capability**
- ❖ **S6 is Defect rate**
- ❖ **S7 is Suppliers pricing**

4.1.5. Delivery performance questioner result

Likert scale was used to analyze the delivery performance as well. To measure the sourcing performance different metrics were used. Among the metrics on time shipment were the one, regarding this measure 10.5 percent of sample respondents replied strongly disagree on time shipment best performance, 28.4 percent disagree, 34.7 percent remains neutral, 22.1 percent agree and only 4.2 percent of sample respondents replied strongly agree.

As far as order fulfillment metric concerned, 12.6 percent of respondents replied strongly disagree on best performance of order fulfillment, 27.4 percent disagree, 24.2 percent were neutral, 30.5 replied agree and the remaining 5.3 percent strongly disagree with the statement "*Orders from different user departments were meet*". The other measure that had been used to analyze the delivery performance were number of delivery faults, 6.3 percent of respondents strongly disagree on minimum delivery faults of the supply chain, 30.5 percent disagree, 28.4 percent remains neutral, 30.5 percent respond agree and only 4.2 percent of respondents replied strongly agree.

On the other hand, quality on delivery was used to analyze the sourcing performance. According to the questioner collected from sample respondents 5.3 percent of respondents replied strongly disagree on performance of quality on delivery, 42.1 percent respond disagree, 17.9 percent stayed neutral, 27.4 percent respond agree and the remaining 7.4 percent replied strongly agree. Transit time were used to analyze the sourcing performance as well, 11.6 percent of respondents replied strongly disagree on the shortness of the transit time, 20 percent respond disagree, 29.5 replied neutral, 33.7 percent respond agree and only 5.3 percent of respondents replied strongly agree.

Effectiveness of delivery invoicing method were used as a metric as suggested by supply chain manager interviewed. Accordingly, 3.2 percent of respondents replied strongly disagree, 33.7, 24.2 percent of respondents replied neither and only 8.4 percent replied strongly agree on the effectiveness of delivery invoicing system. Total distribution cost were used as a metric, 9.5 percent of respondents replied strongly disagree regarding the efficiency of distribution cost. 18.9 percent disagree, 38.9 percent neither, 24.2 percent agree and the remaining 8.4 percent replied strongly agree.

Table 4.5 Delivery performance

<i>Delivery performance score from Likert scale</i>	D1	D2	D3	D4	D5	D6	D7
	Percentage						
<i>Strongly disagree</i> =	10.5	13	6.3	5.3	11.6	3.2	9.5
<i>Disagree</i> =	28.4	27	30.5	42.1	20	33.7	18.9
<i>Neither</i> =	34.7	24	28.4	17.9	29.5	24.2	38.9
<i>Agree</i> =	22.1	31	30.5	27.4	33.7	31.6	24.2
<i>Strongly agree</i> =	4.2	5.3	4.2	7.4	5.3	7.4	8.4

Source* SPSS research data

- ❖ **D1 is On Time Shipment**
- ❖ **D2 is Order Fulfillment**
- ❖ **D3 is Number of delivery faults**
- ❖ **D4 is Quality at Delivery**
- ❖ **D5 is Transit time**
- ❖ **D6 is Effectiveness of delivery invoicing method**
- ❖ **D7 is Total distribution cost**

4.1.6. Correlation

In order to check the impact of the supply chain processes on the overall supply chain performance of the company, as illustrated in the table 4.6 test were run using the Pearson correlation coefficient. The results examining the relationship between performance of main areas of SCOR; plan, source and deliver with overall supply chain by using Pearson correlation indicted a significant relationship.

The study revealed a significant positive relationship between planning performance with overall supply chain performance. ($r=.628^{**}$, $p<0.01$), sourcing performance and delivery performance have also significant positive relationship ($r=.397^{**}$, $p<0.01$ and $r=.469^{**}$, $p<0.01$). As shown in the following correlation statistics all of SCOR processes have established positively significant associations with overall supply chain performance of the organization with correlation coefficient 0.397-0.628. This positive significant bondage supports my framework that I had imagined.

Table 4.6 Correlations

		OSP	OD	OP	OS
OSP	Pearson Correlation	1	.496**	.628**	.397**
	Sig. (2-tailed)		.000	.000	.000
	N	95	95	95	94
OD	Pearson Correlation	.496**	1	.389**	-.004
	Sig. (2-tailed)	.000		.000	.968
	N	95	95	95	94
OP	Pearson Correlation	.628**	.389**	1	.145
	Sig. (2-tailed)	.000	.000		.162
	N	95	95	95	94
OS	Pearson Correlation	.397**	-.004	.145	1
	Sig. (2-tailed)	.000	.968	.162	
	N	94	94	94	94

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

Source* SPSS research data

4.2. Discussion

4.2.1. Planning performance

The Plan processes describe the planning activities associated with operating a supply chain. This includes gathering customer requirements, collecting information on available resources, and balancing requirements and resources to determine planned capabilities and resource gaps. This is followed by identifying the actions required to correct any gaps. (Supply chain council, 2010). More than 77 percent of the respondents' response was not positive regarding the overall planning performance of the supply chain.

Order lead time: Lead time is the total time from when a client makes a request for quotation until the goods arrive at the destination defined on the Pro Forma Invoice. Lead time information can be used to effectively plan procurement orders so that products arrive at desired times. (<http://docs.oracle.com> 17/12/2013). According to interview results from managers and supervisors because of longer order lead time the supply chain department facing challenges from user department, in addition to the interview the questioner result also shows the longer period of time order placement and item delivery.

Material Utilization: Material is required at the right time, right quantity and at right price. Material requirement planning is done by planning department and raise a bill of material. After the material is arrived and consumed its utilization record need to be compiled to determine accuracy of planning (the quantity parameter). Regarding material utilizations ethio telecom supply chain performance is not in a proper position. Interview and questioner result confirm this fact. 80 percent of respondents replied negatively about the efficiency of the material utilization.

Order entry Method: The Order Entry module is designed for high volume and fast processing method for filling and shipping orders according to inventory availability. (<http://www.openpro.com/> 17/12/2013). Even if the questioner result doesn't support managers and supervisors assure that order entry method is simple using ERP and my observation also support this idea.

Accuracy of forecasting: In the modern supply chain, forecasting is necessary for companies that hold items for inventory and that are not hold to order. Companies will use material forecasting to ensure that they produce the level of material that satisfies their customers without making on demand and purchasing situation where too much inventory is produced and remains on the shelf. Accurate forecasting helps organizations improve financial management and helps procure adequate quantities of each product, thereby reducing the likelihood of wastage or shortage, and increasing the likelihood of meeting customer needs with available products (USAID, 2010). The questioner result shows the low level performance of supply chain with regard to forecasting accuracy. A business partner manager expressed this metrics with the example of aironet device. There is aironet demand from banking sector but the device is unavailable because of in efficient forecasting.

4.2.2. Sourcing performance

The Source processes describe the ordering (or scheduling) and receipt of goods and services. The Source process includes issuing purchase orders, scheduling deliveries, receiving, shipment validation and storage, and accepting supplier invoices. (Supply chain council, 2010). More than 90 percent of respondents respond negative and neutral regarding the sourcing performance of the supply chain.

Inward Material Quality: This parameter shall evaluate the adherence of quality standards of material received from vendors to that specified. Concerning this measure only 38.9 percent of respondents defend the efficiency. According to the interview results from managers and supervisors most of the time stationery and commercial items are being presented as per the specification. However, there is problem in network materials.

Quantity and Timely Delivery: This parameter shall evaluate whether the quantity ordered is delivered on time. 62 percent of the respondents replied not negatively regarding this measure. Managers and supervisors support the questioner result.

Procurement Cost: the cost incurred to procure the material i.e. the various costs such as correspondence (e-mail, fax, courier, telephone etc.), conveyance (transportation cost of personnel involved in procurement), official's salary, electricity bills, and etc. because of planning in efficiency on demand purchases are being made. Due to this the procurement cost remains high especially in network materials according to the interview with managers and supervisors.

Material Inventory Level: the stocked inventory level of the company. Higher inventory level increases the capital investment and also acquires more physical space. Balanced inventory level indicates better sourcing efficiency. 52 percent of the respondents were not negative inventory level. Still there is a problem in network items. According to the supply chain manager interviewed, minimum reorder quantity had not been set for network items like commercial items.

Vendor Development Capability: Vendor Development can be defined as any activity that a Buying Firm undertakes to improve a Supplier's performance and capabilities to meet the Buying Firms' supply needs. According to the interview result, ethio telecom work intelligently to develop the capability of its vendors. The questioner result supports this idea as well, only 31.6 percent of respondents replied negatively. At present ethio telecom purchase products from suppliers registered in its supplier list to develop their capability.

Defect rate: defect rate is amount of defective material with in purchased items. According to the procurement manager, they are facing defects in different bulk purchases, for example mobile apparatus like Tana, Samsung, and Smadel. The questioner result indicates the presence defect in different items purchasing.

Suppliers pricing: this parameter were suggested by one of the mangers that had been interviewed, to measure the ethio telecom's supply chain in influencing suppliers to set price that is for the benefit of ethio telecom. The questioner result shoes that only 32.6 percent of the respondents respond negatively, managers and supervisors blame the supply chain in influencing suppliers

4.2.3. Delivery performance

The Deliver processes describe the activities associated with the creation, maintenance, and fulfillment of customer orders. It includes the receipt, validation, and creation of customer orders; scheduling order delivery; pick, pack, and shipment; and invoicing the customer. (Supply chain council, 2010). Regarding the delivery performance only 15.8 percent of the respondents were replied positively. This confirms poor performance of delivery.

On Time Shipment: Shipment at the exporter's end is just the delivery of goods. When the P.O is made for an order, the buyer fixes a favorable date. If these goods are exported by the shipment department as per scheduled date then it is termed as on - time shipment. While delay in shipment is of great concern and dealt with in this parameter, early shipment is also draws a penalty. Only 38 percent of sample respondents defend on time shipment efficiency.

Order Fulfillment: For a company, the quantity to be shipped by the supply chain (as per the Martial requisition) is the order quantity. If the supply chain division ships the exact quantity, then we call it as an order fulfilled. But, in case any variation, whether positive or negative is termed as excess or a short shipment respectively. 64 percent of respondents replied negatively and neutral regarding order fulfillment efficiency of the supply chain. Managers and supervisors shares this idea, order fulfillment couldn't meet because of shortage, materials are being distributed by quota rather than quantity ordered.

Number of delivery faults: Delivery of different material made with insignificant delivery faults, at the time of distribution from central warehouse to different regional, zonal and different branches delivery faults had been made in terms of quantity, product type according to the interview result. 65.3 percent of respondents also replied negatively and neutral regarding delivery faults.

Quality at Delivery: Quality performance is an overall index to measure the capability of a company to churn out goods right the first time in the right quantity, at the right time and right quality. 65.3 percent of the respondents respond not positively. The same is true for managers, they believe quality at delivery is not in a better performance.

Transit time: It is the time taken to export the goods from the source Central warehouse/CWH/ to the warehouse at the destination in different zonal and regional telecom branches. Regarding the time taken to transport materials from CWH to different destination is relatively better than ever before because of increment in the number of heavy truck.

Effectiveness of delivery invoicing method: more than 38 percent of respondents agree with the effectiveness of delivery invoicing. Managers and supervisors confirm the effectiveness of the invoicing method. Except language problem, the packing slip is being printing by English language it is a bit difficult for drivers to communicate.

Total distribution cost: the total cost of distributing material to different regional offices is remains costly, even after the implementation of ERP, this is because improper planning performance for different materials trucks are busy in transporting on demand materials. The questioner result also depicts the costly of distribution cost 67.3 percent of respondents replied negative and neutral on the efficient of distribution cost.

4.3. Summary of findings

- The finding indicates that all constructs of planning processes; material utilization, forecasting accuracy and order lead time are inefficient especially in network items.
- The same is true for sourcing performance of the supply chain, as findings shown the cardinal sin in the supply chain is running out of stock, low level of quality of inward

materials, high cost of procurement, failure of suppliers on timely delivery of commercial, stationery and network materials.

- Early and late deliveries introduce waste in the form of excess cost into the supply chain; early deliveries contribute to excess inventory holding costs, while late deliveries may contribute to operation disruption and loss of goodwill like the happenings this day's. Regarding the delivery performance it remains poor and it needs improvement.
- In general terms the overall supply chain performance of ethio telecom is not operating in a manner that satisfied the current need of internal customers.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

5.1. Conclusions

The ultimate purpose of this paper is to analyze the supply chain performance of ethio telecom by using SCOR frame work presses. Based on the findings presented in the previous section, the following conclusions are drawn.

- Despite the fact that the implementation of ERP system, the planning efficiency of the supply chain remains unsatisfactory that needs continuous assessment and improvement. The finding indicates that all constructs of planning processes; material utilization, forecasting accuracy and order lead time are inefficient especially in network items.
- In recent years, sourcing is evolved from relatively obscure buck office activity to an recognized source of cost saving and relationship building The same is true for sourcing performance of the supply chain, as findings shown the cardinal sin in the supply chain is running out of stock, low level of quality of inward materials, high cost of procurement, failure of suppliers on timely delivery of commercial, stationery and network materials.
- Today ethio telecom internal customers require dependable on-time delivery from their CWH. In the short term, delivery deviations the earliness and lateness from the targeted delivery date - must be analyzed, as both early and late deliveries are disruptive to supply chains. Early and late deliveries introduce waste in the form of excess cost into the supply chain; early deliveries contribute to excess inventory holding costs, while late deliveries may contribute to operation disruption and loss of goodwill like the happenings this day's. Regarding the delivery performance it remains poor and it needs improvement.
- Supply chain processes, as well as other kinds of processes, demand assessment and management models geared towards actions resulting in improvement and measurement of results or impacts of these actions. Quantifying its supply chain

performance levels using a clearly an innovative PMS, represents an opportunity for a company to solidify and align its performance measurements and process improvement actions with its competitive strategies. PMS supported by the use of process frameworks such as SCOR, can be a valuable input into supply chain strategies.

- In general terms the overall supply chain performance of ethio telecom is not operating in a manner that satisfied the current need of internal customers.

5.2. Limitation of the study

Although an attempt were to make the study smooth based on strong methodology, it doesn't make it limitation free. The first limitation of this study were, it's confined only in internal supply chain. This is Because of time and financial resource. If time and financial resources were not scarce, the whole supply chain shall be included in the research.

Secondly, in trying to analyze the performance of the ethio telecom KPI's from SCOR Framework were employed among other models with its own limitation. The limitation includes; Overall performance measurement still difficult and not all processes are included.

5.3. Recommendations

Every link in the supply chain is dependent upon the Plan, so getting it right is vital to the health of the business. Ethio telecom need to be able to generate multi-site distribution plans that respect materials and capacity constraints and be able to quickly adjust those plans as demand changes to ensure that customer orders are delivered on time. Supply Chain Planning solutions like full-fledged ERP system provide global, end-to-end supply chain optimization across the company, enabling ethio telecom to improve service levels, increase productivity, reduce operational costs, minimize order lead time, maximize material utilization, and increase demand forecasting.

Ethio telecom should implement Distribution requirements planning (DRP) a system that replenishes inventory at branch locations throughout a distribution network using a time-phased order point or other logic for every item incorporating commercial, network and

stationery materials. To minimize problem in relation with forecasting accuracy ethio telecom should employ forecasting system, a system that uses historical demand and time series algorithms to predict future demand by forecasting time intervals over the forecasting time horizon.

Ethio telecom should work with its suppliers to increase inward material quality, to minimize procurement cost, to influence suppliers in setting price, to minimize the rate of defect. Increasing sourcing performance is considered as one of the most important variables for improving SC Performance. Efficient sourcing helps to make optimum inventory level, which further improves service level. Service level improvement enhance the internal customer satisfaction level this directs to external customer satisfaction. Efficient sourcing would also help to improve quality level by reducing different types of waste. Timely information sharing system among Ethio Telecom, internal customers/user departments/ and suppliers would alleviate both lead time and inventory problems.

If ethio telecom needs to work toward enabling what we call the unbroken supply chain, the unbroken supply chain is an idealized concept of perfect information flow and perfect material flow, facilitated by all supply chain players thinking and acting as one. Making delivery performance efficient would play an important role. Charming and fully trust communication between Stakeholders like ERCA, EAL and Ethiopian shipping lines.

In order to the overall supply chain performance the company should establish both internal and external integration SAL/Service level agreement/ and OLA/Organizational level agreement/ should be signed. Finally, the researcher recommend further research to examine a wide verity of measures to analyze the internal supply chain using mathematical formulas to measure each metric in the SCOR model which is believed to be appropriate for the company. With this regard ethio telecom officials especially in supply chain area should continuously undertake internal supply chain performance analysis by using standard measures because “You cannot improve what you cannot measure” (Wisner, 2005).

References

- Allahdad. (2012). *A SUPPLY CHAIN MODEL FOR SMEs IN THE WEAVING SECTOR OF PUNJAB, PAKISTAN*. Far East Journal of Marketing and Management, 60-72.
- ANDREW COX, P. I. (2003). *Supply Chain Management a guide to best practice*. Great Britain: PEARSON EDUCATION LIMITED.
- Basnet, C. (2013). *The measurement of internal supply chain integration*. Management Research Review, pp. 153-172.
- Beamon, B. M. (1999). *Measuring Supply chain performance*. International Journal of Operations & Production Management, Vol. 19, No. 3, pp. 275-292.
- Bowersox, D. J., Closs, D. J., & Cooper, B. M. (2007). *Supply Chain Logistics Management*. McGraw-Hill/Irwin, New York.
- Bourne, M.C.S., Mills, J.F., Bicheno, J., Hamblin, D.J., Wilcox, M., Neely, A.D. and Platts, K.W. (1999) 'Performance measurement system design: testing a process approach in manufacturing companies', *International Journal of Business Performance Measurement*, Vol. 1, No. 2, pp.154–170.
- Chen, C.T., Lin, Ching-Tong and Huang, Sue-Fn. (2006), "A fuzzy approach for supplier evaluation and selection in supply chain management", *International Journal of Production Economics*, Vol.102, No.6, pp.141-164.
- Christopher, M. (1998). *Logistics and supply chain management: strategies for reducing cost & improving service*. (2nd Ed.). London: Financial Times Publishing.
- Cooper, M. C., Lambert, D. M., & Pagh, J. D. (1997). *Supply Chain Management: More than a new name for Logistics*. The International Journal of Logistics Management, 8 (1): 1-14.
- Council of Supply Chain Management Professionals (2010), *Supply Chain Management Terms and Glossary*.
- Coyle, J.J., Bardi, E. and Langley, C.J. (2003), *the Management of Business Logistics: A Supply Chain Perspective*, Thomson Learning, Belmont, CA.
- Frohlich, M.T. and Westbrook, R. (2001), "Arcs of integration: An international study of supply chain strategies", *Journal of Operations Management*, Vol. 19, pp. 185-200. (Sunil Chopra, 2007)

- Gunasekaran, A. and Kobu, B. (2007), “*Performance measures and metrics in logistics and supply chain management: a review of recent literature (1995-2004) for research and applications*”, International Journal of Production Research, Vol. 45 No. 12, pp. 2819-40.
- Gunasekaran, A., Patel, C. and Tirtiroglu, E. (2001), “*Performance measurement and metrics in a supply chain environment*”, International Journal of Operations & Production Management, Vol. 21 Nos 1/2, pp. 71-87.
- Habib, M. (2012). *Enhancing Supply Chain Management for the Universities: ITESCM Model Perspective*. Int. J Sup. Chain. Mgt, 11-25.
- Kaplan, R.S. and Norton, D.P. (1992) ‘*The balanced scorecard—measures that drive performance*’, Harvard Business Review, Jan. /Feb., pp.71–79.
- Lambert, D. M., & Pohlen, T. L. (2001). *Supply chain metrics*. *International Journal of Logistics Management*, 12(1), 1.
- Martin, W. (2008). *Operation Excellence*. New York: CRC press.
- Maxwell, J. A. (2005). *Qualitative research design: An interactive approach* (2nd ed.). Thousand Oaks, CA: Sage.
- McCormack, K. (2004), “*The development of a supply chain management process maturity model*”
- McCormack, K. (2008). *Supply chain maturity and performance*. *Supply Chain Management: An International Journal*, 272–282.
- McCormack, K., Johnson, W. and Walker, W. (2003), *Supply Chain Networks and Business Process Orientation: Advanced Strategies and Best Practices*.
- Mentzer, J.T., Dewitt, W., Keebler, J.S., Min, S., Nix, N., Smith, C.D. and Zach, Z.G. (2001), “*Defining supply chain management*”, *Journal of Business Logistics*, Vol. 22 No. 2, pp. 1-25.
- Mohammad Ali¹, D. M. (2012). *Supply Chain Management of Textile Industry: A Case Study on Bangladesh*. *International journal of supply chain management*, 35-40.
- Rao, P. and Holt, D. (2005). *Do green supply chains lead to competitiveness and economic performance?* *International Journal of Operations and Production Management*, 25(9), 898-916.

Seruga2, H. J. (2011). *An Intelligent Supply Chain Management System to Enhance Collaboration*. International Journal of u- and e- Service, Science and Technology, 47-62.

Srinivasan, M., Mukherjee, D. and Gaur, A.S. (2011), “*Buyer-Supplier Partnership Quality and Supply Chain Performance: Moderating Role of Risks, and Environmental Uncertainty*”,

European Management Journal, Vol. 29, pp. 260-271.

Suhong Li, Bhanu Ragu-Nathan, T.S. Ragu-Nathan S., Subba Rao (2006).*The Impact of Supply Chain Management Practices on Competitive Advantage and Organizational Performance*. An International journal of Management Science, Volume 34, pp 107-124.

Sunil Chopra and Peter Meindl. (1998). *Supply Chain Management: Strategy Planning and Operation*. 2nd ed. New Delhi.

Sunil Chopra, P. M. (2007). *SUPPLY CHAIN MANAGEMENT Strategy, Planning, and Operation*. Upper Saddle River, New Jersey.

Supply chain council, S. (2010). *Supply Chain Operations Reference (SCOR®), model Overview - Version 10.0*. Supply Chain Council, Inc.

Thomas, DJ. And Griffin, PM (1996), “*Coordinated supply chain management*”, European journal of Operational Research, Vol. 94 No.1, pp.1-15.

Trent, R. a. (2002). *A Framework to Improve Sourcing Strategy Implementation*. *Academy of Management Executive*, Vol. 16, No. 2, 66-80

USAID. (2010). *Measuring Supply Chain Performance, Guide to Key Performance Indicators for Public Health Managers*. USA: U.S. Agency for International Development

Wisner, JD 2005, *Principles of Supply Chain Management: A Balanced Approach*, South-Western, Mason, OH.

(<http://www.deloitte.com> as of 10/12/2013)

.

.

Appendix



St. Mary University College

School of Graduate Studies

Interview questions to Managers and supervisors.

The following questions has been developed by students from **St. Mary's University** to analyze the supply chain performance of **ethio telecom in fulfilling the requirement of Masters of business Administration**. Your co-operation in responding this interview by answering to the following questions would be greatly appreciated. The overall purpose of this interview is exclusively academic. Your response will not be used for any other purpose; it is confidential. Thank you very much for taking the time for this interview.

1. Your title_____

2. What educational award you achieved?

Diploma Degree Masters PhD

If other specify_____

Section I

In this section the supply chain performance metrics/measure/ Key performance indicator/ in relation with **planning process** are presented. This metrics were collected different articles and informal communications with supply chain experts of ethiotelecom. You are allowed to add metrics which you believe important in measuring planning performance of the supply chain.

№	Metrics or Key performance indicators	Does this appropriate to Ethio telecom? 1. Yes 2. No
1	Order lead time	
2	Material Utilization	
3	Order entry Method	
4	Accuracy of forecasting	
	Add more	

Section II

In this section the supply chain performance metrics/measure/ Key performance indicator/ in relation with **sourcing process** are presented. This metrics are collected from SCOR model by reading different articles and informal communications with supply chain experts of ethio telecom. You are allowed to add metrics which you believe important in measuring sourcing performance of the supply chain.

№	Metrics or Key performance indicators	Does this appropriate to Ethio telecom? 1. Yes 2. No
1	Inward Material Quality	
2	Quantity and Timely Delivery	
3	Procurement Cost	
4	Material Inventory Level	
5	Vendor Development Capability	
6	Defect rate	
7	Suppliers pricing	
	Add more	

Section III

In this section the supply chain performance metrics/measure/ Key performance indicator/ in relation with **delivery process** are presented. This metrics are collected from SCOR model by reading different articles. You are allowed to add metrics which you believe important in measuring delivery performance of the supply chain.

№	Metrics or Key performance indicators	Does this appropriate to Ethio telecom? 1. Yes 2. No
1	On Time Shipment	
2	Order Fulfillment	
3	Number of delivery faults	
4	Quality at Delivery	
5	Transit time	
6	Effectiveness of delivery invoicing method	
7	Total distribution cost	
	Add more	

Section IV

1. What is your opinion about the overall supply chain performance of ethiotelecom?

2. What is your opinion about the planning efficiency of ethiotelecom?

3. How do you explain the sourcing performance of ethiotelecom?

4. Do you think the delivery performance of ethiotelecom is efficient? Please explain?

5. If you have anything to add

Thank you!!



St. Mary's University
School of Graduate Studies

The following questionnaire has been developed by student Afera Muluadam from **St. Mary's University** to analyze the supply chain performance of **ethio telecom in fulfilling the requirement of Masters of business Administration**. Your co-operation in completing this study by responding to the following questions would be greatly appreciated. Please do not put your name on the questionnaire. The overall purpose of this questionnaire is exclusively academic. Your response will not be used for any other purpose; it is confidential. Thank you very much for taking the time to complete this questionnaire, your effort is greatly appreciated. Do not hesitate to contact for any information with **0911510069** or **afeee2000@gmail.com**.

3. Your title_____

4. Gender:

5. What educational award you achieved?

Diploma Degree Masters PhD

If other specify_____

6. Total years of experience in any organization: _____

7. Experience in telecom industry: _____

8. Experience in logistic/ supply chain/ procurement area_____

9. Position in the organization: Cleri Professional

10. Do your company have supply chain measure established?

Yes No

In the next three sections answer first the appropriateness of the metrics by putting: **1 for yes 2 for no and** then answer questions by putting “X” sign on the scale that you believe right.

Section I

In this section the supply chain performance metrics/measure/ Key performance indicator/ in relation with **planning process** are presented. This metrics were collected different articles and informal communications with supply chain experts of ethiotelecom. You are allowed to add metrics which you believe important in measuring planning performance of the supply chain.

№	Metrics or Key performance indicators	Does this appropriate to Ethio telecom?		Question	Strongly disagree	Disagree	Neither	Agree	Strongly agree
		1. Yes	2. No						
1	Order lead time			Period between placing an order and receiving the ordered item from the supplier is short enough.					
2	Material Utilization			Material is required is being purchased at the right time, right quantity and at right price					
3	Order entry Method			Order entry method speedy and accurate.					
4	Accuracy of forecasting			The forecasted consumption and actual consumption are approximately the same.					
	Add more								

1.1. Plan process most affect the overall internal supply chain performance of ethiotelecom.

- Strongly dis agree
- Disagree
- Neither
- Agree
- Strongly agree

Section II

In this section the supply chain performance metrics/measure/ Key performance indicator/ in relation with **sourcing process** are presented. This metrics are collected from SCOR model by reading different articles and informal communications with supply chain experts of ethiotelecom. You are allowed to add metrics which you believe important in measuring sourcing performance of the supply chain.

№	Metrics or Key performance indicators	Does this appropriate to Ethio telecom?		Question	Strongly disagree	Disagree	Neither	Agree	Strongly agree
		1. Yes	2. No						
1	Inward Material Quality			Quality standards of material received from vendors are as per the specification.					
2	Quantity and Timely Delivery			Quantity ordered is delivered on time.					
3	Procurement Cost			Cost incurred to procure the material is efficient.					
4	Material Inventory Level			Stocked inventory level of the company is optimal.					
5	Vendor Development Capability			Sourcing Department is capable to assist vendor during the product development or in Order processing					
6	Defect rate			The rate of defect items from suppliers are minimal or insignificant.					
7	Suppliers pricing			Suppliers set price that keeps the benefit of ethiotelecom.					
	Add more								

1.2. Sourcing process most affect the overall internal supply chain performance of ethiotelecom.

Strongly dis agree

Disagree

Neither

Agree

Strongly agree

Section III

In this section the supply chain performance metrics/measure/ Key performance indicator/ in relation with **delivery process** are presented. This metrics are collected from SCOR model by reading different articles. You are allowed to add metrics which you believe important in measuring delivery performance of the supply chain.

No	Metrics or Key performance indicators	Does this appropriate to Ethio telecom? 1. Yes 2. No	Question	Strongly disagree	Disagree	Neither	Agree	Strongly agree
1	On Time Shipment		All materials shipped to the user on time.					
2	Order Fulfillment		Orders from different user departments were meet.					
3	Number of delivery faults		Delivery of different material made with insignificant delivery faults.					
4	Quality at Delivery		Right material with right specification is Bing delivered at a right time					
5	Transit time		The time taken to transport materials to their destination is optimal					
6	Effectiveness of delivery invoicing method		The invoicing method is effective and clear to understand					
7	Total distribution cost		The cost that is incurred to transport the material is efficient.					
	Add more							

1.3. Delver process most affect the overall internal supply chain performance of ethiotelecom.

- Strongly dis agree
- Disagree
- Neither
- Agree
- Strongly agree

Section IV

6. What is your opinion about the overall supply chain performance of ethiotelecom?

7. What is your opinion about the planning efficiency of ethiotelecom?

8. How do you explain the sourcing performance of ethiotelecom?

9. Do you think the delivery performance of ethiotelecom is efficient? Please explain?

10. If you have anything to add

Thank you!!