



**ADDIS ABABA UNIVERSITY
SCHOOL OF COMMERCE
LOGISTICS AND SUPPLY CHAIN MANAGEMENT UNIT**

**ASSESSMENT OF SUPPLY CHAIN RISKS AND SUPPLY
CHAIN RISK MANAGEMENT PRACTICES: THE CASE OF
ETHIO TELECOM**

A thesis submitted to the Logistics and Supply Chain Management Unit, School of Commerce of Addis Ababa University in partial fulfillment of the requirements for the degree of Master of Arts in Logistics and Supply chain management

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Declaration

I, **Samuel Yoseph**, declare that this work entitled “**Assessment of Supply Chain Risks and Supply Chain Risk Management Practices: The Case of Ethio Telecom**”, is the outcome of my own effort and study and that all sources of materials used for the study have been duly acknowledged. I have produced it independently except for the guidance and suggestion of my Research Advisor and internal examiner. This study has not been submitted for any degree in this University or any other University. It is offered for the partial fulfillment of the degree of Master of Arts in Logistics and Supply Chain management.

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This is to certify that this thesis entitled as “**Assessment of Supply Chain Risks and Supply Chain Risk Management Practices: The Case of Ethio Telecom**”, submitted in partial fulfilment of the requirements for the degree of Master of Arts in Logistics and Supply Chain Management to the School of Commerce of Addis Ababa University, done by **Samuel Yoseph** is an authentic work carried out by him under our guidance. The theme embedded in this thesis has not been submitted earlier for the award of any degree or diploma in any other university to the best of our knowledge.

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ACRONYMS AND ABBREVIATIONS

CWH.....	Central warehouse
ERP.....	Enterprise resource management
ET.....	Ethio Telecom
ETC.....	Ethiopian Telecommunication Corporation
IT.....	Information Technology
RM.....	Risk Management
SC.....	Supply Chain
SCRM.....	Supply chain risk management
SCM.....	Supply Chain Management
SIM.....	Subscriber interface module
SPSS.....	Statistical Product and Service Solutions
VC.....	Voucher Cards

Abstract

Despite the increasing vulnerabilities of supply chains to different costly supply chain risks/disruptions, the practice of supply chain risk management is still in its infancy for many organizations. Thus, to address the emerging need for supply chain risk management practices, the study looks in to supply chain risks affecting Ethio Telecom (ET) and assess ET's supply chain risk management practices. A descriptive research design with quantitative and qualitative approach was used to execute the study. Data was gathered using the questionnaire from 164 respondents (excluding managers) who were selected using the stratified random sampling technique. Besides, using well structured interview questions, qualitative data was also collected from purposefully selected 5 department managers. The findings of the study revealed that, to a varying extent, ET has experienced supply chain risks associated with demand and supply side, risks associated with changes in regulations, infrastructure and catastrophic risks. Furthermore, the study found out that, ET has adopted supply chain risk management practices to a varying extent. In particular, the practice of building long term collaborative relationship with its key suppliers, the practice of developing and using supply chain contingency plans and practice of using back up suppliers were less practiced by the company. Finally, the finding indicated that the company had faced challenges to practice supply chain risk management; particularly lack of flexibility in decision making, lack of awareness and matured culture about risk management practices, lack of technology, lack of policy, Based on the findings, better ways of improving the practices of supply chain risk management were forwarded to ET.

Key Words: *Supply chain risks, Supply chain risk management practices*

CHAPTER ONE

INTRODUCTION

As an introduction of the study, this chapter presents: *background of the study* to shed some light on theoretical and empirical backgrounds in relation to supply chain risks and their management practices, *statement of the problem*, *objectives of the study*, *research questions*, *scope of the study*, *significance of the study*, and *organization of the study*.

1.1. Background of the study

According to the International Risk Management Institute (2007), the perception that the world is an increasingly risky place is becoming a reality. Referring a study made on 500 companies by Fortune magazine, the institute indicated that the overall risk levels have been more than doubled between 1985 and 2006. Specifically, regarding supply chain risks, a number of scholars such as Williams and Heins (1985), noted that today's supply chains are becoming more vulnerable to disruptions with unexpected consequences and impact on their organizational performance. According to Sodhi and Tang (2009), a number of factors contribute to the increasing vulnerability of supply chains such as, the increasing trend of globalization and its associated lengthy supply chains and complexity, the outsourcing practices, reduction of supplier base, more interdependency between supply chain members, the need to reduce buffer inventory, the requirement for shorter inventory and product life cycles, and capacity limitations.

Supply chain risk, according to Christopher and Lee (2004), is "any incident or event that could disrupt the movement and flow of raw materials within an organization or across a given supply chain." In the overall context of supply chain, the major risk factors affecting supply chain members or firms, according to Wagner and Bode (2008), are *demand side risks* (due to such as Volatile demand, insufficient information from customers about orders, distorted information from customers about orders), *supply side risks* (due to such as Poor

logistics performance of suppliers, supplier quality problems, unexpected default of a supplier, and poor performance of logistics service providers.), *infrastructural risks* (due to such as downtime of productions/operations as a result of strikes, accidents, machines/vehicles breakdowns, internal IT system failure) , *Regulatory, legal or bureaucratic risks*(due to such as legislative or fiscal issues, administrative barriers), *Catastrophic risks* (due to such as civil unrest, wars, socio-political crisis, and diseases or other epidemics, natural disasters, terrorist attacks).

Supply chain risk management (SCRM) involves practices that are meant to enhance the implementation of strategies to manage both every day and exceptional risks along the supply chain based on continuous risk assessment with the objective of reducing vulnerability and ensuring continuity(Juttner et al. (2003). As Faisal et al(2006) and many authors on risk management pointed out, risks cannot be completely eliminated from supply chains but effective strategies can be developed and practiced to manage proactively known risks if the dynamics between the variables related to risks in a supply chain are understood. Even though firms have limited control over the events that disrupt a supply chain flow, by adopting effective practices, firms can control how well a supply chain copes with risks/disruptions if occur.

Ethio telecom (ET), previously known as the Ethiopian Telecommunications Corporation (ETC) is an integrated, state owned and sole telecommunications services provider in Ethiopia, providing data/internet and telephone services for about 47.5 million customers. In 2010 Ethiopian government did decide to transform the telecommunication infrastructure and services to a world class standard, considering the company as a key leverage in the development of Ethiopia. Accordingly, Ethio Telecom was born out of Ethiopian Telecommunication Corporation, on November 29th 2010 with the ambition of becoming a world class telecom service provider in 2025.

The supply chain department of Ethio Telecom is named as sourcing and facility Division, structured with 3 major departments: namely: sourcing department, Logistics department and Facilities and Fleet department. The Sourcing department organizes the purchasing and delivery of goods and services within the appropriate framework and in accordance with the company strategic plan and budget. It also manages the company relationship with its suppliers and partners. The Logistics Department, on the other hand, optimizes logistics resources to facilitate goods management by optimizing the Warehouse management, by facilitating goods shipment and by performing inventory management. Finally, The Facilities and Fleet Department provides facilities and fleet to the whole company to support the company's day-to-day operation.

Ethio Telecom is one of the largest government organizational importers / a sole telecommunication service provider/ in Ethiopia having lengthy supply chains both at home and internationally. Except for few office equipments/materials as well as for less complex service requirements, the company transact with many suppliers located outside the territory of the country. Items such as SIM cards and Mobile charging Voucher cards are the major telecom items the company regularly import from abroad and distribute them through own and wholesalers to reach end customers while other high investment telecom devices, equipments, software, consultancy services etc are basically imported and supplied for information system and network departments of the company. With its increasing transactions and relationships with related supply chain actors, as well as due to its big supply chain operations, the vulnerability of the company to supply chain risks has increased more than ever and supply chain risks have actually materialized and affected ET over the last 5 years. The traditional supply chain risk management practices are becoming inadequate to effectively deal with supply chain risks.

Generally, this research aimed to study the most significant supply chain risks affecting ET and to establish the level of supply chain risk management practices ET's supply chain department has been applying. Such studies on

supply chain risk management practices especially in Ethiopian context is hardly available and therefore, the study will also contribute a little knowledge about supply chain risk management practices in the context of Ethiopian organizations.

1.2. Statement of the problem

A global supply chain network that involves different firms, according to Chopra and Mendil(2007), is exposed to a variety of supply chain related risks or disruptions such as Supply delays, demand fluctuations, price fluctuations, and exchange-rate fluctuations, non delivery etc. So, enhancing supply chain operations in such a way that supply chain risks are effectively mitigated is becoming an emerging high priority issue for today's supply chain managers.

Being exposed to a variety of supply chain risks, however, many companies are reluctant or in a weak position to effectively practice proactive and reactive supply chain risk management approaches in a systematic and pragmatic manner. For instance, Based on a multiple case studies conducted on 7 different industries, Christopher et al (2011) found out that most companies did not have a structured management and mitigation practices covering supply chain risks. Similarly, Munyuko (2015) also indicated that despite the huge impact supply chain disruptions have on organization bottom line profits, many organizations still don't have a continuous supply chain risk management program where they systematically practice supply chain risk identification and mitigation activities. Besides, according to Juttner(2003), the concepts of supply chain vulnerability and its managerial counterpart supply chain risk management are still in their infancy.

Ethio Telecom is one of the largest government importers in Ethiopia being engaged in long and complex chains facing increasing supply chain related risks. According to the preliminary interview with the top manager of sourcing department, as well as, the researcher's direct observation as an employee of ethio telecom (having more than 10 years of work experience), it was learned

that over the last 5 years, ethio telecom's inbound supply chain operations specially departments of sourcing, transport and warehousing have faced various types of supply chain risks /disruptions with an increasing trend, to mention those frequent supply chain risks that were actually materialized and affected the company:

- Demand side risks- sourcing and supply chain department of ET being engaging in unplanned sourcing process due to volatile and unpredicted demand from internal user departments, attempting to source with wrong or incomplete specification which finally hinders the final successful delivery.
- Supply side risks-suppliers failing to deliver on time as per the required specification/quality after long time taking tender process, suppliers being unable to supply after signing agreement due to price changes etc
- Administrative barriers- unable to get imported telecom equipments/items such as voucher and SIM cards due to government's administrative barriers such as the very limited access to foreign exchange. This in fact has been cited in the company's first half BSC report (2009 E.C.), as the major challenge especially in year 2016/2017 faced by the supply chain department of ET in its effort to deliver the right items at the right time.
- Internal supply chain operations being disrupted due to failure of internal systems such as ERP, delayed delivery of imported critical telecom items due to the limited transport service access

Despite the increasing trend of supply chain risks affecting the performance of ET's inbound supply chains, according to the preliminary interview I had with the sourcing manager, the level of supply chain risk management practice being implemented by ET's sourcing and supply chain department is at its infant stage as compared to the commonly observed international standard of best practices. To mention few gaps:

- Lack of awareness regarding supply chain risks and their management practices

- Usually, tend to practice a more reactive/firefighting/approach to supply chain risk management i.e. gives heavy emphasis on practices that reduce the negative impact of actually materialized supply chain risks and less to those risks that are not materialized yet.
- Lack of clear and formal supply chain risk management program/policy/strategy that guides the supply chain risk management practices
- There is even no risk register document that specifically record category of expected supply chain risks with their impact level and mitigation options.
- Tend to focus heavily on transferring risks to insurance companies instead of proactively working to avoid possible significant or most commonly occurring supply chain risks from happening.

What is more is that there is almost no considerable study has been conducted on supply chain risk management practices taking the case of Ethiopian organizations. The most commonly available but somehow related studies are about general risk management practices (not about supply chain related risks), financial risk management practices, bank credit risk management practices, construction risk management practice, to mention few. Thus, there is little known knowledge on supply chain risk management practice of Ethiopian public organizations specifically on the telecom sector's inbound supply chain.

Therefore, the study sought to fill the existing research gap, as well as, to analyze supply chain risks actually occurring and affecting ET together with level of supply chain risk management practices being adopted by the company. The study, therefore, aims to provide answers to the major questions: Which supply chain risks actually materialized and affected ET over the last 5 years? To what extent the materialized supply chain risks affected ET? What are the supply chain risk management practices adopted by ET? What are the major challenges ET facing while practicing or to practice supply chain risk management strategies?

1.3. Research questions

The study attempted to find answers for the below major research questions:

1. Which supply chain related risks actually occurred and brought a potential treat to ET in the last 5 years?
2. To what extent those supply chain related risks, which occurred in the last 5 years, affected ET?
3. What supply chain risk management practices are being adopted by ET to mitigate supply chain related risks?
4. What are the major challenges ET faced/facing while practicing supply chain risk management?

1.4. Objectives of the study

1.4.1. General Objective

The major objective of the study is to assess supply chain risks affecting ET and practices of supply chain risk management the company has been adopting.

1.4.2. Specific Objectives

Specifically, the study sought to find answers for the following questions:

- To identify those supply chain related risks that brought a potential threat to ET over the last 5 years.
- To determine the level of extent by which actually occurred supply chain risks affected ET.
- To determine the level of supply chain risk management practices being adopted by ET.
- To assess the major challenges ET faced or facing while practicing supply chain risk management

1.6. Significance of the study

The significance of the study is embodied below;

- This study is important in that it attempts to enrich the theory of supply chain risk management and how such practices are important in enhancing the performance of supply chains.
- Secondly, this study lays the ground to other government institutions like ethio telecom as it generates the need for more attention for supply chain risks and better ways of practicing supply chain risk management.
- The study lets supply chain managers of ET focus more on the management of significant and most frequently occurring supply chain risks in its effort to develop strategy and practices.
- The study also enables ET to understand its major gaps concerning its existing supply chain risk management practices and will come up with a more improved, systematical and continuous supply chain risk management practices.
- Because of establishing a better supply chain risk management practices, ET will be in a better position to respond to the inevitable supply chain risks with minimal damage.
- No doubt that the research already gave great experience for the student researcher regarding research methodology and future problem solving activities.

1.7. Scope of the study

Due to the limitation on time and cost, as well as, due to the need to focus on the major organizational supply chain functions facing significant supply chain risks, the scope of the study is limited to assessing supply chain related risks affecting the inbound organizational supply chain operations of sourcing and supply chain department. Besides, the research does not deal with positive risks/opportunities/ or those risks managers deliberately face to gain more. Here, the negative side of is considered. Hence, risk is equated with disruptions affecting supply chain operations and performance.

In terms of time scope, the study deals with a 5 year period (2013-2017) to assess those supply chain risks which actually materialized and affected ET as well as the most common supply chain risk management practices ET has been implementing. Of course, respondents were asked, at current point of time, to share their experience considering the 5 year period.

Since the supply chain operations of ET follow a centralized operations, the research focused, geographically, on those corporate supply chain related departments of ET that are operating in Addis Abeba, specifically- at the company's head quarter, central warehouses, and transport service center locations(Tele Garaj, Legehar areas).

1.8. Conceptual and operational Definitions

The following key term definitions are provided in order to share a better and common understanding on the concepts and variables to be discussed:

Conceptual Definitions:

Supply chain risk

Christopher and Lee (2004), is "any incident or event that could disrupt the movement and flow of raw materials across the chain."

Supply chain risk management (SCRM)

Wieland and Wallenburg (2012) defined supply chain risk management as the process of implementing strategies to manage supply chain risks based on continuous risk identification and assessment with the objective of reducing vulnerability and ensuring continuity.

Operational Definitions:

Demand Side risks- are measured by the extent of incidentally occurring unanticipated volatile demand and demand based on distorted information. (Wagner and Bode, 2008)

Supply side risks -are measured by the extent of incidentally occurring delivery delays, supplier's quality problems, sudden default of suppliers, and poor service by third party logistic service providers. (Wagner and Bode, 2008)

Regulatory, legal and bureaucratic risks- are measured by the extent of incidentally occurring changes in the political environment, government agencies' administrative barriers. (Wagner and Bode, 2008)

Infrastructure Risks- are measured by the extent of incidentally occurring production downtimes, internal system failures, technical failures, external actors' IT failures. (Wagner and Bode, 2008)

Catastrophic risks- are measured by the extent of incidentally occurring political instability, diseases, natural disasters and terror attacks. (Wagner and Bode, 2008)

Supply chain risk management Practices- are measured by the extent of level of activities (level of building long term collaborative relationship with key suppliers, level of risk analysis and management awareness, level of keeping extra inventory, level of suppliers capacity assessment, level of using back up suppliers, level of developing and using contingency plans and level of using insurance) being adopted to enhance the implementation of supply chain risk mitigation strategies. (Juttner, 2003) and (Manuj and Metzger, 2008)

1.9. Organization of the study

The study paper is organized in five chapters. Chapter one is composed of background of the study and the target organization, statement of the problem, research questions, objectives of the study, significance of the study, scope of the study and organization of the study. The second chapter deals with the review of related literature. Chapter three discusses research methodology details. Results and Discussion part is presented on the fourth chapter. Lastly, chapter five presents the conclusion, the recommendation, the limitations of the study and suggestion for future research.

CHAPTER TWO

REVIEW OF RELATED LITERATURES

This chapter focuses on the review of various studies that have been conducted by other researchers on Supply chain risk management practices. Among the areas reviewed includes supply chain, risk, supply chain risks, supply chain risk management, supply chain risk management process, supply chain risk management practices and review of related empirical studies. Finally, the conceptual framework of the study is presented.

2.1. Theoretical Background

This part discusses the key concepts or components that constitute supply chain risk management.

2.1.1. Supply chain

Many authors defined supply chain in their own different way and there exists no single definition of it. However, Spring and Stevenson (2007) provided a generic definition of supply chain as “the supply chain is the network of organizations that are involved, through upstream and downstream linkages, in the different processes and activities that produce value in the form of products and services in the hands of the ultimate customer.”

2.1.2. Supply chain management

Supply chain management, according to Hugos (2003), is “the coordination of production, inventory, location, and transportation among the participants in a supply chain to achieve the best mix of responsiveness and efficiency for the market being served”. Christopher (2011) defined supply chain management as the management of upstream and downstream relationships with suppliers and customers in order to deliver superior customer value at less cost to the supply chain as a whole. For Sodi and Tang(2012) supply chain management is the process that includes coordination and collaboration of processes, flows(materials, information, finance), activities across different functions such

as marketing, sales, production, product design procurement, logistics, finance, and information technology within a given supply chain.

2.1.3.Risks and risk management

Many authors defined risk as being vulnerable. According to Wikipedia, Risk is the potential of gaining or losing something of value. Cambridge dictionary defines risk as —the possibility of something bad happening. The Concise Oxford dictionary defines risk as —a situation involving exposure to danger or loss; the possibility that something unpleasant will happen. Khan and Burnes (2007) defined risk as —the likelihood for an uncommon event to happen, and the negative effects this event will have on the organization. Generally, risk is defined by many as any future uncertain event that may lead to negative or positive outcome.

Ritchie and Brindley (2009) identified 3 common dimensions of risks: Likelihood of occurrence of a particular event or outcome, Consequences of the particular event or outcome occurring and exposure or Causal pathway leading to the event. The likelihood of occurrence, more usually termed the probability, can be expressed in objective terms or in subjective terms, each being capable of measurement. Objective measurement relies on previous records of the occurrence of such events. Subjective assessment of the likelihood of occurrence relies more on the translation of previous experience and intuition. In practice there is likely to be the application of subjective judgments on any objective data. The causal pathway/exposure/ has particularly important implications for risk management. Understanding the nature, sources and causes of factors that generate the events or circumstances which might influence the type and scale of consequences (i. e. both positive and negative), and the likelihood of their occurrence are fundamental requirements for effective risk management.

2.1.4. Supply chain risks and their categorization

In order for companies or supply chain members devise and practice effective means of supply chain risk mitigations strategies/methods, according to Chopra et al. (2004), managers must first understand supply chain risks together with the events and conditions that drive them. Having knowledge about supply chain risks enable companies to customize their supply chain risk management approaches and practices. There is no consensus among scholars on the definition or category for supply chain risk. Supply chain risks, according to Christopher and Lee (2004), are any incident or event that could disrupt the movement and flow of raw materials across the chain. Wagner and Bode (2009) defined a supply chain risk/disruption as "the combination of (1) an unintended, anomalous triggering event that materializes somewhere in the supply chain or its environment, and (2) a consequential situation which significantly threatens normal business operations of the firms in the supply chain."

Various authors in the literature classified supply chain risks in a different ways. To mention few; Waters (2007) classified supply chain risks as internal and external supply chain risks, while Christopher (2011) categorized supply chain risks as supply risks, demand risks, process risk, control risk and Environmental risk. Based on the function and association of supply chains, Vikulov and Butrin (2014) also classified supply chain risks as Risks associated with suppliers, risks associated with transport, risks associated with warehousing, risks associated with production and risks associated with marketing. In a more related manner, Wagner and Bode (2008), identified and categorized supply chain risks as demand side risks, supply side risks, Regulatory, legal and bureaucratic risks, Infrastructure Risks and Catastrophic risks. Details of the mentioned classifications are further discussed below with more focus on the categorization indicated by Wagner and Bode (2009):

Waters (2007) identified two kinds of risks appearing in supply chain context; namely, internal risks and external risks. Internal supply chain risks are

operational risks that management has control over such as late deliveries, having excess stocks, poor forecasts, financial risks, minor accidents, human errors, faults in information technology systems. Such internal supply chain risks are manageable. For instance, risks from suppliers can be avoided by multiple sourcing, and when problems occur with one supplier it is easy to switch orders to another. Similarly, risks to the flow of materials are reduced by holding stocks throughout the supply chain to insulate the flows from unexpected variations. On the other hand, external supply chain risks are those risks that come from outside the supply chain for which management has no direct control such as earthquakes, hurricanes, industrial action, wars, terrorist attacks, outbreaks of disease, price rises, problems with trading partners, shortage of raw materials, crime, financial irregularities, etc. Managers cannot change the external risk situation but can design operations that work as efficiently as possible within such a risky environment.

While auditing the supply chain risk profile of a given company, according to Christopher (2011), organizations need to identify and analyse potential risks that bring disruptions arising from five major sources: namely,

1) Supply Risk- how vulnerable is the business to disruptions in supply? Risk may be higher due to global sourcing, reliance on key suppliers, poor supply management, and etc.

2) Demand risk-How volatile is demand? Does the 'bullwhip' effect cause demand amplification? Are there parallel interactions where the demand for another product affects the demand for ours?

3) Process risk- How resilient is our processes? Do we understand the sources of variability in those processes, e.g. manufacturing? Where are the bottlenecks? How much additional capacity is available if required?

4) Control risk-How likely are disturbances and distortions to be caused by our own internal control systems? For example, order quantities, batch sizes and safety stock policies can distort real demand. Our own decision rules and policies can cause 'chaos' type effects. And

5) Environmental risks-Where across the supply chain as a whole are we vulnerable to external forces? Whilst the type and timings of extreme external events may not be forecast able, their impact needs to be assessed.

In a related but specific manner, Vikulov and Butrin (2014) also identified supply chain risks that firms face in relation with their suppliers or their internal functions as- *associated with suppliers* (due to such as failing to meet delivery schedule, delivering poor quality, price changes, not delivering/short delivery), *associated with transport* (due to such as damage of goods in transit, loss of goods in transit), *associated with warehousing* (due to such as damage of goods during storage, unnecessary costs of warehousing), *associated with production* (due to such as quality problems, overproduction, disruptions due to machine breakdowns or procurement issues) *and associated with marketing*(due to such as volatile demand, wrong promotion strategy, failure of networking sales).

While Wagner and Bode(2008) categorized supply chain risks as demand side risks, supply side risks, regulatory, legal and bureaucratic related risks, infrastructure risks and catastrophic risks. Their details are discussed below:

Demand Side Risks

This are risks that arise as a result of disruptions emerging from downstream supply chain operations such as disruptions in the physical distribution of products to end consumer, uncertainty caused by customers' unforeseeable or unanticipated volatile demands or mismatch between forecasts and actual demands as well as from poor supply chain coordination like due to poor information system, distorted demands/requirements etc. Usually affect demand forecast quality and cause the bullwhip effect which is an amplification of demand volatility in the upstream direction of the supply chain.

Supply side Risks

Supply side risks are those risks associated with the upstream side of supply chains. The upstream part of a company's supply chain can be a major resource of supply chain disruption. These interruptions can be due to suppliers, supplier relationships and networks, and purchasing activities. As Wagner and Johnson (2004) indicated, Supplier business risks relate to events that affect the continuity of the supplier and result in the interruption or termination of the buyer-supplier relationship. This concerns particularly the threat of financial instability of suppliers and the consequences of supplier default, insolvency, or bankruptcy. Risks that arise as a result of poor logistics performance of suppliers, supplier quality problems, sudden default of a supplier, and poor logistic performance of third party service providers, unable to meet supply due to capacity fluctuations/shortage are some factors to be included under supply side risks.

Regulatory, legal and bureaucratic risks

Regulatory, legal and bureaucratic risks refer to “the legal enforceability and execution of supply chain-relevant laws and policies (e.g., trade and transportation laws) as well as the degree and frequency of changes in these laws and policies.” The regulating, legal and bureaucratic risk is the legal enforceability and performance of laws and regulations, guidelines, or policies that have an impact on the supply chain. The frequency and degree of changes in these guidelines can be the resource of supply chain risk because a sudden modify in these guidelines may lead to the offenses of laws and regulations, or guidelines. Supply chain operations can be restricted or hindered by Administrative barriers (e.g., customs, trade regulations) and sudden Legal changes.

Infrastructure Risks

The risk source "infrastructure" includes disruptions that materialize from the infrastructure that a firm maintains for its supply chain operations. It includes socio-technical accidents such as equipment malfunctions, machine breakdowns,

disruptions in the supply of electricity or water, IT failures or breakdowns, in addition to local human-centered issues. Firms have become increasingly dependent on technological innovation (IT) as well; therefore, IT-related issues can significantly impact supply chain management. These issues consist of hardware failures or application bugs, as well as issues created by individual activities such as harmful application, or cyber-attacks.

Catastrophic Risks

This class subsumes pervasive events that, when they materialize, have a severe impact on the area of their occurrence. Such events can be epidemics or natural hazards (force majeure), socio-political instability, civil unrest, and terrorist attacks. The negative consequences on supply chains are obvious since production facilities and transportation systems are highly vulnerable to natural disasters. Due to the globalization of markets and a surge in globe-spanning supply chain operations, local catastrophes have increasingly indirect global repercussions. Terrorist acts affect supply chains either directly (e.g., destruction of logistics infrastructure) or indirectly (e.g., port closures for security reasons imposed by the government)

2.1.5. Supply chain risk management

There exists no single definition of supply chain risk management in the literature. For instance, according to Juttner *et al.* (2003), supply chain risk management means “the identification and management of risks for the supply chain through a coordinated approach amongst supply chain members, to reduce supply chain vulnerability as a whole.” For Charter and Rogers (2008), supply chain risk management is “the ability of a firm to understand and manage its economic, environmental, and social risks in the supply chain” which could be materialized by the adoption of contingency planning and having a resilient and agile supply chains. According to Cook (2007), supply chain risk management is all about developing inbound supply chain risk management strategy with a primary purpose to continuously identify exposures, transferring financial risks,

and mitigating potential losses through proactive mitigation and loss control activities.

According to Waters (2007), supply chain risk management is responsible to ensure that the principles established by senior managers are applied to supply and logistics risks. So, the management of supply chain risks starts with senior managers analyzing the organization's overall risk strategy and identifying its requirements. Then, they must start designing their own long term plans for risks in the supply chain which includes all the long-term goals, plans, policies, culture, resources, decisions and actions that relate to risks within a supply chain.

The main elements of this strategy, as Waters (2007) indicated, are usually presented in a written document, which is called a risk policy, strategic plan, management plan or some equivalent title. This policy or strategy document does not consider specific risks, but it describes a general view of supply chain risk and how managers will approach risky events. The contents of this policy or plan vary widely, but typically include: statements of who is responsible, review of the organization's attitude towards risk, summary of policies for supply chain risk management, a review of resources, systems, tools available for risk management, procedures, methods and tools for assembling a list of risks and their causes, likelihood and consequences, procedures, methods and tools for analyzing the impact of risks their significance and means of developing mitigation strategies and controlling risks. The existence of a supply chain risk strategy suggests some high-level commitment to the management of supply chain risks, and it sets the context for progressively more detailed decisions and actions at lower levels, where the strategic aims are translated into operational terms and implemented.

2.2. The need for supply chain risk management

Today's supply chains, according to Christopher (2011), and also, Craighead et al., (2007), are becoming more vulnerable to supply chain risks mainly due the

more focus given to efficiency instead of balancing lean and agility, the globalization and its associated lengthy and complex supply chains, tendency to centralize production and distribution centres, the increasing trend in outsourcing and its associated loss of control, and reduction of the supplier base. Similarly, While discussing on current trends that increase the need for supply chain risk management, Sodi and Tang(2009) also indicated that the increasing vulnerability of supply chains that is coming as a result of events such as increased use of outsourcing of manufacturing and R&D to suppliers, globalization of supply chains, reduction of supplier base, more intertwined and integrated processes between companies, reduced buffers, shorter lead times requirements, shorter product life cycles and compressed time-to-market, increased product/service complexity and capacity limitation of key components are creating a huge need for supply chain risk management.

Furthermore, as per the empirical studies conducted on Global 1000 firms, conducted by Craighead et al., (2007), it was found out that supply chain risks or disruptions and their associated operational and financial risks were reported as top executive's single most pressing concern of their job. Cooper(2003) and Magnan & Christopher(2005) also indicated that as supply chain performance for successful organization is known to be important, the management of risks within supply chain performance, however, is not getting the attention it deserve by many organizations, considering its contribution to the supply chain and organizational performance.

2.3. Processes of supply chain risk management

Even though the main aim of the study is to understand more about supply chain risks and their management practices, it is important to understand the basic processes of managing supply chain risks which lay out the framework by which supply chain managers/members implement practices of supply chain risk management in a systematic and proactive manner. A number of authors in the field have forwarded different methodologies/processes/steps of supply chain risk management. To mention few:

Sodhi and Tang (2012) and also Ritchie and Brindley(2009) viewed supply chain risk management as a proactive step by step process involving identification of supply chain risks, assessment of supply chain risks, mitigation of supply chain risks and responding to incidents through communication, coordination and other mechanisms. In a more elaborated manner, Manuj *et al* (2008) also suggested related 5 steps/processes for companies to follow when managing supply chain risks: 1) risk identification 2) risk assessment and evaluation 3) selection of appropriate risk management 4) implementation of supply chain risk management strategy and 5) mitigation of supply chain risks. The 5 common processes of supply chain risk management are briefly discussed below:

2.3.1. Risk identification process

Risk identification consist the first stage of SCRM process. In order to achieve a mitigation plan in a satisfactory level, it is necessary to map as many of the possible hazards that threaten the firm. Thus, it is critical to mention that risk identification should be continuous in order to ensure that the management team is aware of all the possible risks. According to Musa (2012), risk identification involves determining which risks are likely to affect the supply chain and documenting the characteristics of each risk. It is proposed that risk identification should be undertaken on a regular basis throughout the life cycle of the supply chain.

Waters (2007) admitted that it is unrealistic to list all possible risks but it will possible for managers to identify those most significant supply chain risks they face. Furthermore, he suggested the below procedures to follow while identifying most significant supply chain risks: 1) define the overall supply chain process 2) Define this into a series of distinct, related operations. 3) Systematically consider the details of each operation 4) identify the risks in each operation and their main features. 5) Describe the most significant risks in a register.

According to Munyko (2015), there are many ways to identify and categorize risks, and each organization has its own way for developing its *risk register*: a list

of identified risks with their importance rating. To identify most significant supply chain risks, Waters (2007) suggested firms to use supply chain risk identification tools: historical data analysis, brainstorming, cause and effect analyses, scenario planning, supply chain mapping, relative importance to the supplier and the customer. Similarly, Mburu et al. (2015) discussed supply chain risk identification methods such as supply chain audits, personal experience and past performance data analysis methods. Amemba (2013) also indicated supply chain risk identification strategies such as periodic procurement audits; inventory forecasting; pre-screening of supplier's capacity; joint specifications writing teams; periodic quality assessment reviews; pre-bidding meeting with suppliers; and joint procurement planning teams.

Developing an initial risk register, according to Munyko (2015), is a one-time effort, and is necessary to identify baseline risks. Too many organizations start a risk management program without knowing what threats the organization faces, or what consequence a disruption would have. As a result, they focus too much protecting against the wrong threats or too little protecting against threats that matter. Worse, they may fail to anticipate important threats, or fail to recognize the consequence an apparently minor threat may have.

2.3.2. Risk assessment and evaluation process

In this stage the management team has to analyze the most significant supply chain risks that have been identified before. Not all of those risks are critical for the supply chain, so it is necessary to include in the analysis which are most significant in terms of their impact. According to Sodhi and Tang (2012) risks can be separated into normal and abnormal. Normal risks are identified as those risks that can be managed into the supply chain management. Risk assessment is not considered necessary for those risks. On the other hand, abnormal risks are those risks that can cause significant losses to the company and the possibilities of occurring cannot be predicted precisely, as there is scarcity of data and difficulties in accessing them.

2.3.3. Selection of appropriate risk management strategy process

After finishing with the assessment and evaluation, the next stage is to select the appropriate strategy. This strategy has to be tuned with the general corporate and the supply chain strategy. Juttner et al (2003) asserts the below four generic supply chain risk mitigation strategies: 1) Avoidance, 2) Control, 3) Cooperation, 4) Flexibility

Table: 2.1. Supply chain risk Mitigation strategies

SNO.	Risk Mitigation Strategies in Supply Chain	Possible sub strategies/practices
1	Avoidance	<ul style="list-style-type: none"> • Dropping specific products/geographical markets/supplier and/or customer organizations
2	Control	<ul style="list-style-type: none"> • Vertical integration • Increased stockpiling and the use of buffer inventory • Maintaining excess capacity in productions, storage, handling and/or transport • Imposing contractual obligations on suppliers
3	Cooperation	<ul style="list-style-type: none"> • Joint efforts to improve supply chain visibility and understanding. • Joint efforts to share risk-related information • Joint efforts to prepare supply chain continuity plans
4	Flexibility	<ul style="list-style-type: none"> • Postponement • Multiple sourcing • Localized sourcing

Source: Juttner et al (2003)

In another point of view, Wagner and Bode (2009) classified the supply chain risk mitigation strategies in to two- cause-oriented mitigation strategies and effect oriented mitigation strategies. Cause-oriented mitigation strategies aim to prevent any risks from occurring or from disrupting by focusing on potential causes of risk events. For instance: to source materials or products to which their origin is known, not to sustain own operations in risky geographic areas, not to source from suppliers that produce in risky geographic areas, to collaborate with customers and suppliers by having open transparent supply chain and open information exchange, monitoring suppliers regularly for potential risks they

may cause. On the other hand, effect oriented mitigation strategies attempt to reduce the negative impact of supply chain risks. Possible effect oriented mitigation strategies are transferring as much risk as possible to the supplier, to use flexible contract options with suppliers, developing contingency or business continuity plan to address supply chain risks, to have late product differentiation to mitigate demand side risks, to hold additional inventory and capacity buffers to mitigate the consequences of potential supply chain disruptions, to insure against supply chain related risks etc. organizations can effectively practice supply chain risk management if they are guided by cause and effect oriented strategies.

2.3.4. Implementation of supply chain risk management strategy process

There are several characteristics that are important prior to the implementation of the strategy. As the information technology is considered an important factor of the SCRM process, the filtering of the data and the important information is vital. Moreover, the understanding of the firm structure will help to improve communication between employees and the management.

2.3.5. Process of mitigating supply chain risks

Despite having a risk management plan plotted it is not sure that all risks are tackled down. Risk management covers risks that are possible to happen. Thus an alternative strategy is required in order to cover unexpected events that are going to lead to unexpected losses.

Generally, most authors agree that supply chain risk management process are not intended to totally eliminate risks but they are required to systematically reduce the negative impacts or prevent most significant supply chain risks from being materialized.

2.4. Supply chain risk management practices

Supply chain risk management (SCRM) practices, according to Juttener(2003), Manuj and Metzger(2008), are activities meant to enhance the implementation of strategies to manage both every day and exceptional risks along the supply chain based on continuous risk assessment with the objective of reducing vulnerability and ensuring continuity. By practicing supply chain risk management strategies, organizations can proactively reduce the company's vulnerability levels in the presence of possible supply chain disruptions. Due to certain practices of supply chain risk management, certain sources of risk can be prevented from developing, but due to the numerous sources of risks a supply chain may face; it's very difficult to control all of them due to unmanageable future unforeseen situations/incidents.

To have an effective supply chain risk management practice, Chopra and Sodhi(2004), suggested that managers must do three things when they begin to construct a supply chain risk management strategy and practice. First, they must create a shared understanding among organization members about supply chain risks and their categories; second, they must determine the factors that trigger them. Having a clear common understanding about supply chain risks and their factors, managers can select strategies that are relevant to their organization and practice the supply chain risk management accordingly.

While there are no objectively listed practices of supply chain risk management, a number of scholars have been suggesting possible best supply chain risk management practices. While conducting the review of possible supply chain risk management practices forwarded by different scholar on supply chain risk management, Adam (2014) came up with the below commonly pointed out list of possible supply chain risk management practices:

2.4.1.Practices of long term collaborative relationship with key suppliers

Building long term relationships with suppliers, according to Chopra and Meindl (2007), can generate more opportunities for saving than the two parties working

independently. However, solid and fruitful cooperation is likely to result if related supply chain members have a long term relationship with a considerable degree of trust. When the relationship is longer, suppliers tend to show great effort on issues that are important to a particular buyer. Besides, the level of communication and coordination among parties will be improved, when the relationship is long term and trustworthy.

2.4.2. Knowledge about risk and risk analysis practices

To have an effective supply chain risk management practice, Chopra and Sodhi(2004), suggested that managers must do three things when they begin to construct a supply chain risk management strategy and practice. First, they must create a shared understanding among organization members about supply chain risks and their categories; second, they must conduct supply chain risk analysis to determine the factors that trigger them. Having a clear common understanding about supply chain risks and their factors, managers can select strategies that are relevant to their organization and practice the supply chain risk management accordingly.

2.4.3. Practices of maintaining extra inventory

Based on Sheffi(2005), maintaining redundant inventory, according to Adem(2014), is one possible approach to handle disruption specially for long lead time, single sourced critical materials. Extra inventory arrangements for finished goods can handle risks emerging from market demand fluctuations, buffer stock for raw materials can help companies cop up with risks emerging from the supply base. However, supply chain managers are advised to implement such practices for long lead, single sourced and critical elements as maintaining too much buffer can lead to increased inventory cost and quality problems even though it saves from disruptions of supply chain operations/productions. As Hugos(2003) indicated ,If demand forecasting could be done with perfect accuracy, then the only inventory that would be needed would be cycle inventory. However, since there is some degree of uncertainty in forecasting, keeping additional inventory is important in case demand and supply side risks

happened. The trade-off here is to weigh the costs of carrying extra inventory against the costs of losing sales or disruption of operation due to insufficient inventory.

2.4.4. Practices of supplier capacity assessment and qualification screening

This is a practice of screening and monitoring regularly current and potential suppliers with response to potential supply chain risks using different methods such as self assessment templates or internally developed risk scoring methods. According to Chopra and Meindl (2007), suppliers should be assessed considering important factors such as Replenishment lead time, On-time performance, Supply flexibility, Delivery frequency/minimum lot size, Supply quality, Inbound transportation cost, Pricing terms, Information coordination capability, Design collaboration capability, Exchange rates, taxes, and duties, Supplier viability, capacity to fulfill contractual obligations. Based on assessment of suppliers' capacity, some companies demand suppliers to present proof that they have the capacity/competency to fulfill their contractual obligations. As indicated by Elkins *et al* (2010) strategic Sourcing or Advanced Procurement primarily deals with developing supply market intelligence

2.4.5. Practices of keeping back up suppliers

Keeping back up suppliers is found to be helping companies to insure the raw material flow is safe and uninterrupted. Studies by Xu and Nozick (2009) suggested for "capacity reservation contract" in which a secondary supplier guarantees any amount of delivery up to the reserved capacity. With this arrangement company can mitigate the risk in the supply base without incurring the cost of keeping excess inventory. According to Wilson (2007), having a redundant supplier is appropriate for high value items that do not share the same disruption risk.. For example, sourcing from two suppliers in the same region would impact the material supply when a disaster (e.g., an earthquake) happens in that region.

2.4.6. Practices of developing and using contingency plans

As Sodhi and Tang (2009) indicated, Contingency planning means developing a plan to be resilient or prepared to respond to and restore operations after an unexpected disruption occurs. It usually serves as disaster recovery plan. The contingency plan involves a series of activities and resources required to be performed and be available in times of risk events. Supply chain risk mitigation strategies are implemented “before” the occurrence of different risk events. However, according to Sodhi and Tang (2009), while certain mitigation strategies such as contingency plans can be put in place in advance, the actual deployment of different contingency plans can only be implemented “after” the occurrence of risk events. When a risk event occurs, contingency plans enable supply chain members to quickly restore supply chain operations and thus reduce the negative impact caused by the risk event. The aim of the contingency plan is to minimize potential loss by identifying, prioritizing, and safeguarding assets that need protection, with the goal of the organization being able to reduce risk exposure and save valuable resources in the event of a disruption or disaster.

2.4.7. Practices of transferring supply chain risks through insurance

(Waters, 2007) mentioned that when the risk is too high for one organization to accept, an insurance company can pool the risks and share the costs. Transferring supply chain risks through insurance is followed by organizations which follow the risk management strategy of accepting/tolerance i.e. such organizations doesn't do anything to reduce the potential sources of risk events but transfer the risk, partially or fully, to insurance companies in case there is a risk incident. According to Sodhi and Tang (2012), transferring risk to insurance companies is the most widely practiced risk management approach. They further indicated that although it can provide financial comfort to a company in the case of a disruption, it can't protect the company from the portion of business lost while inactivate or from the bad reputation it may earn due to the lack of the procedures it should have had in the event of a disruption.

Insurance as a supply chain tool for managing risk is a crucial and important element of any program, and has been for centuries. For example, maritime insurance has always protected shipping from perils like piracy and sinking, which often meant a 100 percent loss to cargo. However, as Lynch (2009) pointed out, the practice of transferring risks to insurance companies has the below limitations or consequential further risks:

- Insurable losses under protected or not protected at all
- Insured coverage inadequate to cover the full extent of the loss
- Uninsurable losses that are assumed, incorrectly, to be covered
- Excluded perils assumed covered but, in fact, excluded in the policy terms

According to Kersten *et al.* (2007), practicing the transfer strategy is most suitable when a potential damage to physical assets is very high and when the continuance of the firm is not affected.

2.5. Challenges of supply chain risk management practices

Supply chain risk management practices are one of challenging aspects of supply chain management. Christopher & Lee (2004) indicated, various factors hinder risk mitigation or management practices, to mention few:

- Lack of trust among supply chain members- which makes it difficult for supply chain members to share information and risks –which leads to distorted information and bullwhip effects
- The increased geographical distance between supply chain members
- Lack of knowledge about supply chain risks and their management practices
- Low priority to risk management and Lack of risk management culture
- The tendency to focus on strategies and practices that bring revenue forgetting issues that bring risk and damage to their firm
- High investment cost in relation with technologies that increase visibility

Ritche and Brindley (2009) pointed out that lack of supply chain risk management knowledge, abilities and experience are the major barriers to practice supply chain risk management. While Fraser (2003) indicated that lack

of top level support from the management is also a challenge to practice supply chain risk management. Kersten *et al*, (2007) on the other hand indicated that lack of transparency and the insufficient trust within supply chain networks are mainly responsible for the slow implementation of supply chain risk management. Due to the lack of transparency, companies are not able to recognize the current sources of their supply and demand side risks in most cases and don't coordinate to share and mitigate risks.

2.6. Critical Success factors for supply chain risk management practices

For supply chain risk management process become successful, many authors suggested their own recommendations. For instance, Ritche and Brindley (2009) indicated that like other management approaches, management quality in terms of knowledge, abilities, experience and skills is important for successful supply chain risk management. Similarly, Fraser (2003) indicated that top level support and executive level leadership is important ingredient for successful supply chain risk management.

On the other hand, Sodhi and Tang (2012) suggested two approaches for the successful management of supply chain risks: - 1) management must create a shared organization-wide understanding of supply chain risks for instance through stress testing 2) then, management must determine how to adapt general risk mitigation approaches to the circumstances of their particular company and develop a robust supply chain strategy. Chopra and Meindl(2007) also agreed with the need to have a customized supply chain risk mitigation strategy indicating that Every mitigation strategy comes at a price and may increase other risks. For example, increasing inventory mitigates the risk of delays but increases the risk of obsolescence. Acquiring multiple suppliers mitigates the risk of disruption but increases costs because each supplier may have difficulty achieving economies of scale. Thus, it is very important to develop tailored mitigation strategies to have effective and efficient supply chain risk management system.

According to Giunipero & Eltantawy(2004), Continuous monitoring and improvement, is also another critical factors that needs to be part of every iterative risk management process. Thus, for supply chain risk management to be effective, risk management activities need to be performed regularly and frequently. Risk monitoring and continuous improvement help to optimize effectiveness and efficiency of all previous risk management steps.

2.7. Review of related Empirical studies

There have been a large number of studies published about risk management in general. However, the number of the empirical studies conducted on supply chain risk management practices is relatively very small. The following is an attempt to summarize the main findings of some selected studies:

2.7.1. Supply Chain Risks

Wagner and Bode (2008) examined the supply chain performance along the several dimensions of supply chain related risks. They analyzed supply chain risks and their sources affecting supply chain members/firms. Based on the literature and interviews with practitioners, they compiled and empirically validated constructs for different classes of supply chain risks affecting organizations. Besides, they examined the relevance of various supply chain risk sources for strategic decision-making based on the relationship between supply chain risks and supply chain performance. They particularly founded that demand side and supply side risks have strong impact on supply chain performance as compared to the impact other supply chain risks bring. Even though the article lays the ground for supply chain managers to understand supply chain risks so that they base their strategy on identified supply chain risks, the actual practices what supply chain members should follow to mitigate supply chain risks were not discussed on the article.

While studying the supply chain risks of the Ghanaian cocoa industry using a quantitative approach, Sarpong *et.al* (2013) found out that those cocoa related

diseases, high inflation rate and instability of the local currency were found as the key casual factors of commercial related risks whilst ineffective information sharing among supply chain members contributed to environmental related risks negatively affecting productivity.

Hessami and Savoji (2011) also attempted to identify and rank supply chain risks for Iran's companies and based on their impact on organizational performance, ranked supply chain risks orderly as follows: environmental, financial, strategic, informative and communicative technology, technology and equipment, human resources and supply chain risks. The most influential and important risk was regarded as environmental risk. Environmental insecure and competition severity of organizations and managers have confronted companies with several challenges. The second risk, from the view point of importance was recognized as financial risk. Instable financial policies, exchange rate fluctuation, rate of inflation, global market changes, all have increased the importance of financial risk. The third risk was strategic risk which can bring danger to the way organizations are governed.

2.7.2. Supply Chain Risk Management Practices

Using a descriptive research design, Adem(2014) studied the supply chain risk management practices of the Kenyan Power sector and found out that the power sector in Kenya have implemented the supply chain risk management practices to a varying extent. Particularly, found out that the practices of developing and using contingency plans, using back up suppliers and suppliers disruption historical background checks had not been practiced with due focus. The study further revealed that the power sectors have suffered supply chain disruptions specifically-risks associated with stock outage, fire outbreak, IT system breakdowns and environmental disruptions. Finally, the study affirmed that there exist a statistically significant relationship between loss of critical stock and supply chain risk management practices adopted by the organization.

Amemba (2013) studied various possible supply chain risk management practices/strategies to be implemented together with their impact on supply chain performance taking a case of Kenyan medical supplies agency (KEMSA). The study used a descriptive research design and descriptive statistics for its analysis. The study found out that risk identification practices such as periodic procurement audits, inventory forecasting, pre-screening of supplier's capacity, joint specifications writing teams, period qualitative assessment reviews, pre-bidding meeting with supplier and joint procurement planning teams affected supply chain performance of the agency. In addition, implementing risk analysis and evaluation strategies affected the performance of supply chain at KEMSA through whole life costing of supplies; frequency analysis on previous occurrence of supply risks; brainstorming meetings with supply partners; cost benefit analysis of potential risks and internal quality assessment of supplies. Finally, practices of risk control and monitoring affected supply chain performance through continuous training on risk management, Pre-shipment inspection of supplies, inventory control techniques, liquidated damages clauses, post qualification of suppliers capacities, contract management system, fixed pricing contracting, compressive record keeping, insurance of supplies and performance security from suppliers.

Similarly, Munyuko (2015) studied the impact of supply chain risk management on organizational performance taking the case of Andy forwarders and logistics services and found out that there was a direct link between supply chain risk management and organization performance. It was concluded that supply chain risks affect organization performance in the event they materialize and therefore there was need for organization to identify risk exposure, analyze the risk exposure and have in place mitigation practices for the risk identified within their supply chain. Boey (2015) studied the impact of cyber supply chain risk management on supply chain performance of 105 manufacturing firms and found out that there is significant effect of cyber supply chain risk management in terms of governance and operation on supply chain performance with

information system security practices showing a very significant effects on supply chain performance.

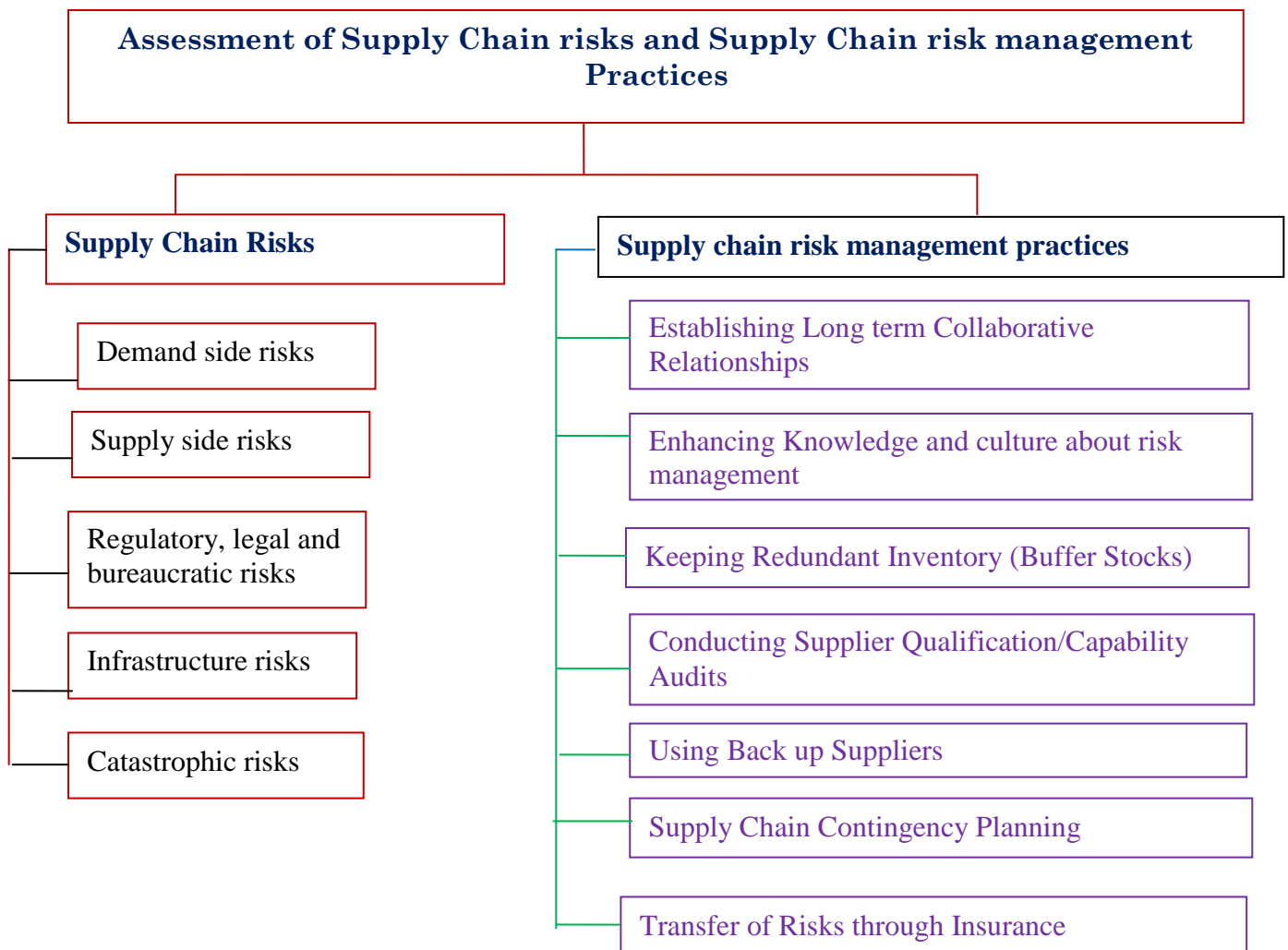
Blackhurst *et al.* (2005) also empirically examined issues related to supply chain disruption discovery, disruption recovery, and SC redesign and found out that practices of increasing the visibility of supply chains, building in more slack capacity, designing real-time response and using damage control systems, and using tools/models for SC design enhances the ability of firms to deal with disruptions. Norrman and Jansson(2004) studied the supply chain risk mitigation processes and practices of Ericsson company and found out that the company adopted a four-stage process of supply chain risk management: *Risk identification* — mapping of the upstream supply chain to identify critical aspects, sources of risk, and the likelihood of their occurrence; *Risk assessment*— analyze each risk source to obtain a perspective on how to avoid business interruptions due to the risk; *Risk treatment* — development of alternative risk mitigation strategies with corresponding costs and their potential to address specific risks; and *Risk monitoring* — focuses on analyzing the process by which specific risks and developing standardized templates to handle similar risks.

In the Ethiopian context, however, it was found to be difficult to find available research conducted on practices of supply chain risk management. However, it is observed that there are few researches conducted on somehow related risk management practices(not directly related to supply chain risk management practices), for instance: Addis (2014) studied construction contract risk management practices in Ethiopian building construction projects, while Tsion(2015) studied risk management practices of the commercial bank of Ethiopia focusing on financial risk management practice.

2.8. Conceptual Framework

The conceptual framework part regarding supply chain risks affecting a firm was adopted from the taxonomy of supply chain risks identified by Wagner and Bode (2008) where most common supply chain risks were identified and categorized based on their sources. Regarding the supply chain risk management practices, it was adopted from Adem (2014) who reviewed and assessed possible supply chain risk management practices that are recommended by various scholars/empirical researchers in the field of supply chain risk management.

Figure: 2.1. Conceptual Framework of the study



Source: Adapted from Wagner and Bode (2008) and Adem (2014)

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.1. Description of the study Area

This study was conducted on Ethio Telecom (ET) specifically focusing on its supply chain department. The supply chain department of Ethio Telecom is named as sourcing and facility Division, structured with 3 major departments: namely: sourcing department, Logistics department and Facilities and Fleet department. The Sourcing department organizes the purchasing and delivery of goods and services within the appropriate framework and in accordance with the company strategic plan and budget. It also manages the company relationship with its suppliers and partners. The Logistics Department, on the other hand, optimizes logistics resources to facilitate goods management by optimizing the Warehouse management, by facilitating goods shipment and by performing inventory management. Finally, The Facilities and Fleet Department provides facilities and fleet to the whole company to support the company's day-to-day operation.

The study aimed to assess those supply chain risks that brought potential threat to ET's supply chain department over the last 5 years and determine the level of supply chain risk management practices adopted by ET. Since the supply chain department of ET has a centralized organizational structure, the study collected data about the company's experience with regard to supply chain risks and their management practices from those staffs working in the corporate sourcing and supply chain department of the company. The staffs considered in the study were normal level employees, supervisors and managers working at corporate level. Hence, the study area dealt with employees and managers working in Ethio Telecom's central supply chain department which is located in Addis Abeba, Ethiopia.

3.2. Research Design and Approaches

This study applied the descriptive research design with qualitative and quantitative approaches to study supply chain risks and their management practice adopted by ET. The descriptive design was adopted because, according to Creswell (2009), it allows the researcher to study the elements of supply chain risks and their management practices in their current state without necessarily making any change to them. The descriptive design is found appropriate to obtain information concerning the current status of the phenomenon to describe what the current situation is with respect to the variables of the study. Such descriptive design has been used for similar studies on supply chain risk management practices- for instance, by Amemba (2013), Adem (2014) and Addis (2014).

The study used both quantitative and qualitative approaches, as Creswell (2009) indicated, using both quantitative and qualitative techniques in data analysis provides significant strength to the overall validity and reliability of a research. Plus, due to the nature of data being collected i.e. some data using interview (qualitative) and the rest via questionnaire (quantitative), the mixed approach was selected.

3.3. Unit of Analysis

The unit of analysis, as Saunders *et.al* (2009) indicated, covers what actually the case is about, for instance; an individual, organization, an event or an entity. Accordingly, the case is about supply chain related risks affecting ET and how employees and managers of ET working in the department of sourcing and supply chain practice supply chain risk management. In order to have a clear picture about supply chain risks affecting ET and supply chain practices of ET, it is believed that those employees and managers working in the corporate/central sourcing and supply chain department, are in a better position to share their direct observation and experience with regard to their supply chain risk

management practices. Potentially, they are the ones who have close/direct access to observe/face supply chain risks, practice supply chain risk management strategies or observe practices of supply chain risk management. Therefore, the major unit of analysis in this study was ET's sourcing and supply chain department having corporate level employees and managers of ET.

3.4. Target Population

According to Wren (2004), the purpose of sampling is to gain an understanding about some features or attributes of the whole population based on the characteristics of the sample. The target population is defined as "the total group to be studied, the grand total of what is being measured" within a defined area (Burns & Bush 2003). The target population in this study is restricted to 248 staffs of ET working in the corporate sourcing and supply chain department.

3.5. Sampling techniques and Sample Size

Stratified random sampling was used to randomly select respondents from each divisions/sampling frames, who conform to the purpose of the study questionnaire. According to Saunders *et.al* (2009) dividing the population into a series of relevant strata means that the sample is more likely to be representative, as each of the strata is represented proportionally within the selected sample. Besides, to have thorough understanding regarding the overall supply chain risk management practices and philosophies of the company, supply chain department managers of ET were purposefully selected for interview.

A sampling frame, according to Adams *et al.*, (2014), is "the list of all the items where a representative sample is drawn from." In order to get a more direct insight about the supply chain risk management practices of ethio telecom, the study focused on those supply chain staffs who are directly involved in either facing supply chain risks or in managing such risks. It follows that, using the online sample size calculators ([www. Surveysystem.com](http://www.Surveysystem.com)), the sample size for study population size of 248 is calculated with 95% confidence level and 4 point

margin of error. Accordingly, the total sample size to be considered from ET's supply chain supervisors and professional staffs was 176.

Then, to fairly represent the study population size of 248 staffs and to give a closer insight to risks occurring across the internal supply chain, stratified random sampling was used by which proportional samples were taken from each working sections (a total of 176 sample sizes for the questionnaire) as follows:

Table: 3.1. Study Population, Sample Size

Sampling frames/Supply chain working sections	Study Population from supervisors and employees	Proportional Sample size
Sourcing Section	86	61
Supplier relationship Section	43	31
Logistics/Goods shipment	30	21
Warehouse and Inventory	40	28
Fleet Management section	49	35
Total	248	176

Source: research data (2017)

Furthermore, to gain broader perspectives and understanding about the supply chain risk management philosophy of ethio telecom, it was planned to interview all the 5 managers of the above major supply chain departments-sourcing, supplier relation managed, Goods shipment/logistics, warehouse/inventory management, fleet management, as well as 1 manager from the central risk management department were involved in the interview. Thus, the total sample size planned to be taken was 182 out of which 176 were randomly selected staffs/for questionnaire/, while 6 of them were purposely selected department managers for interview (1 manager from each supply chain department).

3.6. Data sources and type

The study used both Primary and Secondary Data. Primary data was collected using key data collection instruments- the questionnaire and interview. While secondary data was collected from available company reports, published records such as textbooks, journals, magazines, company manuals and procedures.

3.7. Method of data collection

The primary data was collected mainly via questionnaire and interviews methods.

The questionnaire was adopted from scholars who have conducted related valid study regarding supply chain risk management and a little bit customized to align it with the objectives of the study. A closed- ended questionnaire was administered to the respondents. The questionnaire was distributed after the expected respondents were randomly selected and briefed about the overall study area and objectives of the study. The questionnaire was selected as a major data gathering tool because the researcher believed that the questionnaire would help respondents to easily remember their previous experiences and observation regarding supply chain risk management issues when they are presented with possible choices.

Besides; **the interview method** was used to have a thorough and broad understanding of key conceptual areas or philosophy of purposefully selected management members in relation with supply chain risk management. The data obtained from the interview was used to strengthen the collected information through the questionnaire. Before the interview was conducted, the researcher briefly explained the overview of the study and objectives of the research.

3.8. Validity and Reliability

According to Adams *et al.*,(2014), reliability and validity are the major criteria for testing and evaluating measurement of variables and ensuring the quality of data, research design methods and the overall accuracy of the study.

3.8.1. Validity

Validity refers to how exactly a scientific investigation is carried out and how accurate the instruments and methods are, according to the purpose of the study. It's to study what you really intended to study and nothing else. Accordingly, to ensure the Validity of the study, the following activities were carried out:

- Both content and face validity of the questionnaire was investigated with the support of experts in the area of supply chain risk management. The experts /supervisor of the study, 2 classmates, 2 practitioners/ were asked to rephrase or edit any items found unclear, inappropriate or irrelevant.
- Besides, the research questions, the conceptual framework and the data collection instruments were aligned to make sure the study focus on what it intends to measure.
- The conceptual framework and the questionnaire were adapted from the available reviewed literature forwarded by known scholars in the area of supply chain risk management and customized a little bit to suite the objectives of the study.
- To decrease random error (different interpretations) and improve understanding of the questionnaire items, the adapted survey which was available in English language was translated in to Amharic language by official translation service provider operating in Ethiopia named Ethio Translation Service.

3.8.2. Reliability

Reliability implies that a measuring instrument should be able to give reliable and stable results. If it is reliable other researchers should be able to come to the same results if they use the same method. To determine the reliability, a pilot test of 15 questionnaires was distributed to colleagues and ET randomly selected staffs to test and check the reliability of the items of the questionnaire and to make the necessary correction. Those who participate on the testing were excluded from the main data collection process. Then, the internal consistency of the questionnaire was tested using Cronbach's alpha reliability measurement

scales. According to Field (2009), using Cronbach alpha, coefficient alpha provides a good estimate of reliability. Alpha values of 0.7 or higher are considered to be adequately reliable. Values between 0.5 and 0.7 are acceptable while values of below 0.5 are considered to be less reliable.

Accordingly, a reliability test on 15 questionnaires (excluded from the main data analysis) was conducted using alpha coefficient. Plus, the entire data which was available for analysis was tested for reliability. Accordingly, after removing one redundant and less relevant question from the indicator of supply chain risk management practice of having inclusive risk management from, the data collection instrument was found to be adequately reliable and consistent (with each main variables scoring chronbach's alpha value of 0.7 and above. when tested by data collected using the sample 15 questionnaires as well as by the entire main data used for the analysis of the study, as the below table indicates, the internal consistency of the questionnaire was found to be adequately acceptable.

Table: 3.2. Reliability Test Result (Chronbach's Alpha)

Supply chain Risks	Chronbach's alpha for 15 sample questionnaires	Chronbach's alpha value for entire analysis data
Demand side Risks/DSR/ with 2 items	0.725	0.78
Supply Side Risks/SSR with 5 items	0.771	0.784
Regulatory, legal and bureaucratic risks/RLBR/ with 2 items	0.744	0.789
Infrastructure Risks/IR/ with 4 items	0.712	0.75
Catastrophic risks/CR with 4 items	0.712	0.70
supply chain risk management practices	Chronbach's alpha for 15 sample questionnaires	Chronbach's alpha value for entire analysis data
Long term collaborative relationship/LCR/ with 4 items	0.79	0.8
Knowledge about risk and risk analysis practices/KR/ with 3 items	0.721	0.735
Redundant stock/extra inventory arrangement/RS/ with 3 N items	0.733	0.7
Supplier capacity assessment and qualification screening/SCA/ with 3 items	0.75	0.8
Back up supplier arrangement practice(BUS) with 3 items	0.849	0.855
Supply chain Contingency planning(SCP) with 2 items	0.845	0.84
Transfer of supply chain risks through insurance(TRI) with 3 items	0.717	0.70
Overall Reliability of the instrument having a total of 21 items that measure Supply chain risk management practices	0.69	0.71

Source: SPSS Output (2017)

3.9. Ethical Considerations

The researcher conducted the study in line with ethio telecom's organizational policy regarding any intellectual property rights of the organization. The researcher strictly respected ethio telecom's code of conduct and did not seek to access any confidential documents. Besides, the privacy of respondents was kept confidential and their response was used only for academic purposes. What is more is that all the materials and sources that were used as reference were properly acknowledged.

3.10. Data analysis

There are three objectives in data analysis, according to Sekaram (2003), i.e. getting a feel for the data, testing the goodness of the data, and answering the research question. Establishing the goodness of data lends credibility to all subsequent analysis and findings because it measures the reliability and the validity of the measures used in the study. Accordingly, after gathering data from the questionnaire and the interview, the data was checked adequately for reliability and clarification. Then, the data collected via questionnaire was entered into a computer and analyzed using Statistical Package for Social Sciences (SPSS version 20) to measure the reliability and validity. The qualitative data gathered via the interview was also analyzed in line with the quantitative data collected using the questionnaire. The software packages enabled the researcher to analyze the data using tools of descriptive statistics, particularly using frequencies, mean and standard deviations.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.1. Introduction

This chapter analyzes and presents the data collected from primary sources (the questionnaire, interview) and secondary sources (document review) regarding the supply chain risk management practices of ET. The study had 4 objectives: to identify those supply chain related risks which actually occurred and affected ET over the last 5 years; to determine the level of extent by which actually occurred supply chain risks affected ET; to establish the supply chain risk management practices being implemented by ET; and to assess the major challenges ET faced or facing in implementing supply chain risk management practices. Descriptive analysis was used to present the result from the questionnaire. The empirical findings were cross-referred with the literature relevant to the study.

4.2. Overall Empirical Result of the study

4.2.1. Response Rate

A total of 176 questionnaires were distributed for employees of ET working in the department of sourcing and supply chain. Out of which 164 questionnaires were returned with complete response, while 3 questionnaires were rejected due to missing/incomplete data and unfortunately 8 questionnaires were returned with no response. Overall, the response rate is 93.18%, which is adequately enough to conduct the study.

Table: 4.1. Response Rate

Working section	Total study population	Questionnaire distributed	Questionnaire returned with response	Returned rate (in %)
Sourcing Section	86	61	58	95.08%
Supplier relationship	43	31	29	93.55%
Logistics/Goods shipment	30	21	19	90.48%
Warehouse and Inventory	40	28	25	89.29%
Fleet Management section	49	35	33	94.29%
Total	248	176	164	93.18%

Source: research data (2017)

Therefore, 164 questionnaires were used for the data analysis to present the findings and draw conclusion. Furthermore, out of 6 top department managers (including 1 corporate risk manager) planned for personal interview, it was possible to actually conduct the interview with 5 of them (83.33%) i.e. managers of sourcing, supplier relationship, warehouse management, Transport management and corporate risk management department were willing to be interviewed.

4.2.2. Demographic profile of respondents

This study was only aimed at those employees working in the department of sourcing and supply chain management as it is believed that the employees are the one who directly face supply chain risks or the primary ones who work to mitigate supply chain risks. So, the researcher believed that relevant data would be available if the study focus on data being collected from employees of ET's sourcing and supply chain department. Accordingly, the data was gathered proportionally from employees of ET working in the department of sourcing and supply chain having work units- sourcing, supplier relations, logistics/goods shipment, Central Warehouse management and Fleet management sections. The majority of respondents are from sourcing section constituting 35, 37% out of the total of 164 respondents. Respondents from

fleet management constitute 20.12%, while respondents from suppliers' relations and central warehouse respondents take the share of 17.68% and 15.24%, respectively. The smallest number of respondents comes from logistics section constituting the remaining 11.59% of the total 164 respondents. The detail is presented in the following table 4.2:

Table: 4.2. Distribution of demographic variable-Work Unit of Respondents

variable	Work Units	Frequency	Percent
Working Section/Unit	sourcing	58	35.37%
	supplier relations	29	17.68%
	Logistics/Goods shipment	19	11.59%
	central warehouse	25	15.24%
	Fleet Management	33	20.12%
	Total	164	100

Source: SPSS Output (2017)

The level of education can potentially influence the understanding respondents have about supply chain risks and their management practices. The respondents were asked to indicate their level of education and as per the result, the majority of respondents (52%) are degree holders, while 43.3% are diploma holders and the remaining 4.3% have second degree/Master/. There are no respondents having below diploma level education. Hence, all the respondents are potentially in a better position to understand the research questions and provide the relevant information regarding supply chain risks and their management practices. Details of the result are indicated in table following table 4.3.

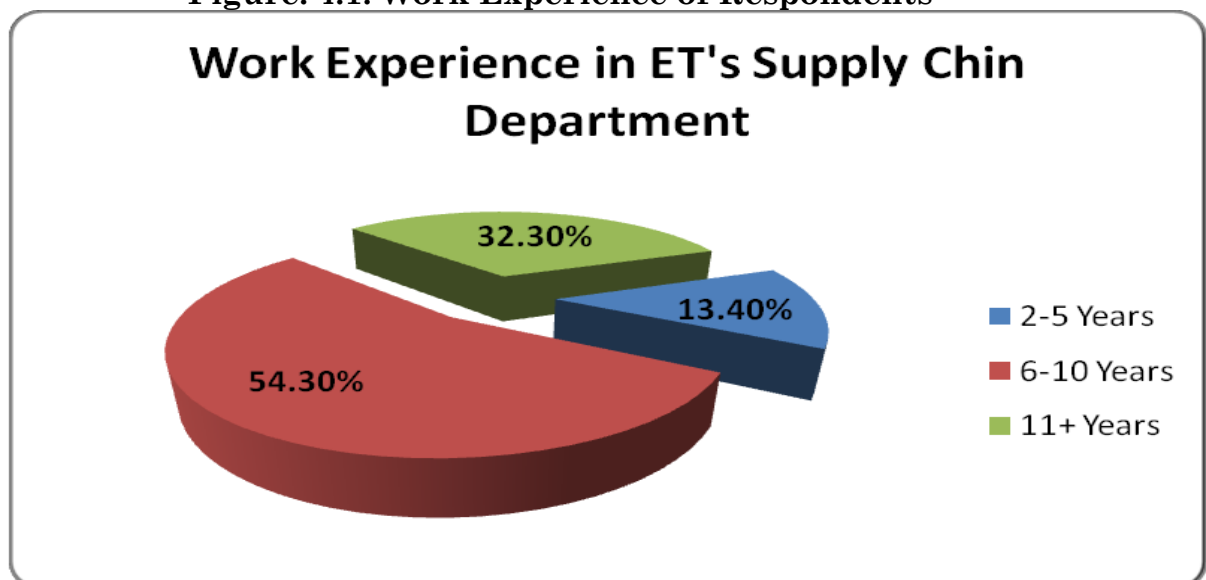
Table: 4.3. Education Level of Respondents

variable	Highest Education Qualification	Frequency	Percent
Education Level	Diploma	71	43.3%
	Degree	86	52.4%
	Masters	7	4.3%
	Total	164	100

Source: SPSS Output (2017)

The other variable that the respondents were asked was number of years they had worked in ET specifically in the department of sourcing and supply chain management. This variable is important in that, the experience of respondents in sourcing and supply chain department provides relevant and reliable information about supply chain risks affecting the inbound supply chain of ET and their management practices ET had been implementing over the last 5 years. Thus, for this question, majority (54.3%) of the respondents answered they had 6-10 years of work experience in sourcing and supply chain domain, while 32.3% indicated they have 11 and more than years of experience and the remaining 13.4% said they have 2-5 years of work experience specifically in the department of sourcing and supply chain of ET. This indicates that all the respondents have been working in the department of sourcing and supply chain long enough to understand and share their relevant experiences regarding supply chain risks affecting the company, the most common supply chain risk management practices they and their department usually follow. The pie chart shown on the following figure shows the detailed result:

Figure: 4.1. Work Experience of Respondents



Source: SPSS Output (2017)

4.3. Identification of supply chain risks ET experienced

As Waters (2007) admitted, it is unrealistic to list all possible supply chain risks but it is possible for managers to identify those most significant supply chain risks they face or actually experienced in their mitigation. In fact, it is only when supply chain risks are identified (either from future expected risks or from previously materialized supply chain risk incidents) that practicing supply chain risk management is more effective. Over the last 5 years, ET has experienced various types of supply chain related risks. According to the information collected from the interview with 4 managers (sourcing, supplier relations, logistics and corporate risk managers), as well as from researcher's own direct observation ET has faced the below supply chain related risks that were actually materialized/affected the company's operations to a different extent, over the last 5 years:

- Demand side risks- sourcing and supply chain department of ET being engaging in unplanned sourcing process due to volatile and unpredicted demand from internal user departments, attempting to source with wrong or incomplete specification which finally hinders the final successful delivery.
- Supply side risks-suppliers failing to deliver on time as per the required specification/quality after long time taking tender process, suppliers being unable to supply after signing agreement due to price changes etc
- Administrative barriers- unable to get imported telecom equipments/items such as voucher and SIM cards due to government's administrative barriers such as the very limited access to foreign exchange. This in fact has been cited in the company's first half BSC report (2009 E.C.), as the major challenge especially in year 2016/2017 faced by the supply chain department of ET in its effort to deliver the right items at the right time.
- Internal supply chain operations being disrupted due to failure of internal systems such as ERP, delayed delivery of imported critical telecom items due to the limited transport service access

The level of impact the actualized supply chain risks may differ but with the exception of some catastrophic risks such as epidemics, natural disasters and international terror risks, all the supply chain risks discussed i.e. supply side risks, demand side risks, risks associated with changes in the legal, regulatory and bureaucratic environment, risks in relation failure of infrastructures and some catastrophic risks such as risks associated with political instability(such as due to the recent protests in some parts of the country, some vehicles of the company were damaged by some protesters or were not able to freely move in some parts of the country-disrupting the flow of supply chain operations for instance the distribution of mobile voucher cards and SIM cards) exposed some vehicles incidents have been experienced by ET.

4.4. Extent of disruption by actually materialized supply chain risks

After identifying actually occurred supply chain risky incidents over the last 5 years, knowing the extent to which the actualized supply chain risks affected ET is the next research question that needs answers. Accordingly, respondents were asked to determine the extent of disruption/negative impact by actually materialized supply chain risks over the last 5 years.

The extent was measured on a Likert scale of 0-1 where: 0= No extent, 1= Small Extent, 2= Moderate Extent, 3= Great Extent and 4= Very great Extent. So, the greater the mean, the greater the extent of agreement while the greater the standard deviation, the greater the level of variation in the responses. A mean (M) score of ($0 < \text{mean} < 0.4$) means-No extent, ($0.5 < \text{mean} < 1.4$) -to small extent, ($1.5 < \text{mean} < 2.4$)-to moderate extent, ($2.5 < \text{mean} < 3.4$) means to a great extent and a mean score ($3.5 < \text{mean} < 4$) means to a very great extent. The following table 4.4. Shows the descriptive statistics for extent of supply chain risks affecting ET over the last 5 years.

Table: 4.4. Descriptive Statistics showing the extent of supply chain risks affecting ET over the last 5 years

S.No.	Major variable	Supply Chain Related Risks	N	Mean	Std. Deviation
1	Demand side Risk	Demand side risk-Unexpected volatile demand	164	3.33	.587
		Demand side risk-demand based on distorted/insufficient information	164	3.17	.515
2	Supply side risk	supply side risk-suppliers' poor logistic performance	164	2.54	.882
		supply side risk-quality problems	164	2.44	.921
		supply side risks-sudden default	164	1.35	.492
		supply side risks-poor logistic performance of third party service providers	164	2.99	.709
		Supply Side Risk- capacity fluctuation/shortage	164	2.21	.739
3	Regulatory, legal and bureaucratic risks	Regulatory, legal and bureaucratic risk-change in the political and legal world	164	2.08	.743
		Regulatory, legal, bureaucratic risk-administrative barriers	164	2.45	.786
4	Infrastructure Risks	Infrastructure Risks-loss of capacity to produce due to local disruptions	164	1.09	.668
		Infrastructure Risks- failure of internal systems	164	1.16	.703
		Infrastructure Risks-unable to produce due to technical reasons	164	1.18	.609
		Infrastructure Risk-due to failure of external IT systems	164	1.20	.530
5	Catastrophic risks	Catastrophic Risk-political instability, war, civil unrest	164	.68	.467
		Catastrophic Risk- Epidemics	164	.64	.481
		Catastrophic Risk- Natural disasters	164	.49	.501
		Catastrophic Risk-Terrorism	164	.23	.419

Source: SPSS output (2017)

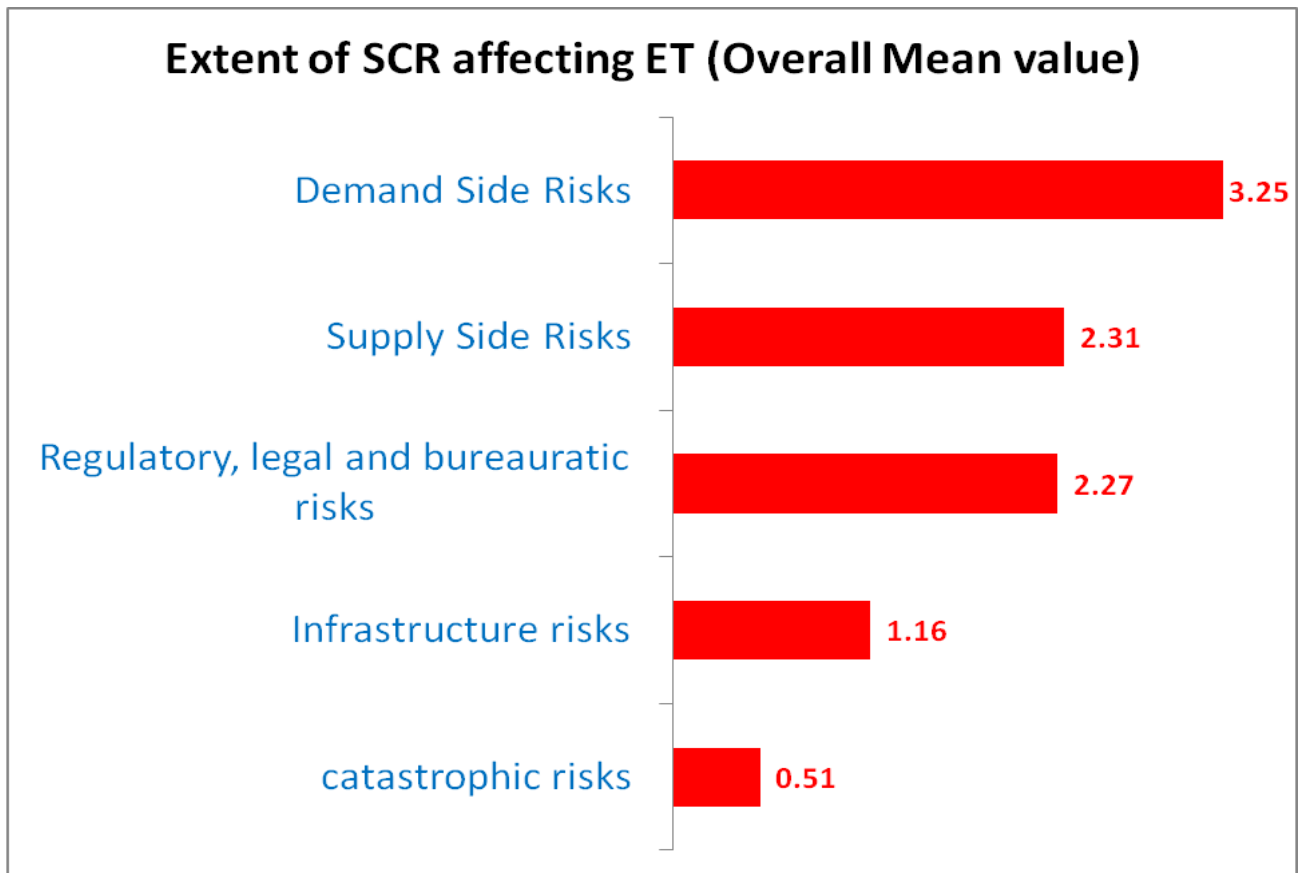
According to the research results provided above, ET has not experienced supply chain risks to a very great extent ($3.5 \leq \text{mean} \leq 4$). However, to a great extent ($2.5 \leq \text{mean} \leq 3.4$), ET has been affected by demand side risks (unexpected volatile demand risks and risks associated with distorted information/requirements and some specific supply side risks (i.e. Poor logistics delivery system of suppliers and poor logistic service of third party service providers) and the magnitude of the standard deviation indicate that variance in the respondents view regarding the demand side and the mentioned supply side risks are very small. The result further indicates that, supply side quality related risks (poor quality delivery from suppliers), risks associated with suppliers being out our capacity to

supply/capacity shortage to supply the need materials as per the required specifications) and legal administrative barriers such as foreign exchange availability administrations has affected ET to a moderate extent($1.5 \leq \text{mean} \leq 2.4$).

To small extent ($0.5 \leq \text{mean} \leq 1.4$), ET has been affected by supply chain risks specifically, risks associated with a bankrupted supplier, all infrastructure risks (loss of production capacity , internal system failures, technical failures, external IT systems being used by actors with whom ET relates for its supply chain operations) and catastrophic risks(political instability, epidemics, natural disasters, terrorism). Furthermore, the result reveals that ET has not been affected over the last 5 years to no extent ($0 \leq \text{mean} \leq 0.4$) by catastrophic risks arising from natural disasters and international terrorism. Actually, such catastrophic risks has not actually occurred significantly affecting the company but if it had occurred over the last 5 years, the extent of its impact would have been very great extent considering the huge damage such risks bring.

Overall, Demand side risks as a whole affected ET to a great extent as shown by overall mean value of 3.25, while supply side risks and risks associated with regulatory, legal and bureaucratic changes were reported as affecting ET over the last 5 years to moderate extent as evidenced by overall mean value of 2.31 and 2.27, respectively. On the other hand, infrastructure and catastrophic risk affected ET to small extent with overall mean values of 1.16 and 0.51. The extent to which the major supply chain risks affected ET is depicted in the following figure 4.2.

Figure: 4.2. Extent of supply chain risks affecting ET



Source: SPSS output (2017)

By referring actually occurred supply chain risk incidents, such as the most significant ones mentioned above- demand side risks and specific supply side risks, ET can enhance further its supply chain risk mitigation strategy development and mitigation practices. The result clearly implies that ET was exposed to various supply chain risks with varying extent i.e. from small extent to great extent and similar trend should be expected pushing the need for more focus for supply chain risk management practices.

4.5. Supply chain risk management practices of ET

In this section, the study aimed to know the extent to which ET had been practicing supply chain risk management. The extent was measured on a Likert scale of 0-4 where: 0= No extent, 1= Small Extent, 2= Moderate Extent, 3= Great Extent and 4= Very great Extent. So, the greater the mean, the greater

the extent of agreement while the greater the standard deviation, the greater the level of variation in the responses. A mean (M) score of ($0 < \text{mean} < 0.4$) means-No extent, ($0.5 < \text{mean} < 1.4$) -to small extent, ($1.5 < \text{mean} < 2.4$)-to moderate extent, ($2.5 < \text{mean} < 3.4$) means to a great extent and a mean score ($3.5 < \text{mean} < 4$) means to a very great extent. Detailed results of the study are presented below:

4.5.1. Long Term collaborative relationship practices

The study result indicates that, overall, the practices of building long term collaborative relationship with key suppliers (valuing long term relationship, sharing risks with suppliers, trust based relationship building and collaborating with suppliers to be lean and responsive) were implemented to small extent(evidenced by overall mean value of 1.11) as a way of managing supply chain risks. This was supported by the interview data as reported by sourcing and supplier relations managers, building collaborative relationship with suppliers is one of the major challenging practice especially for government owned organizations as there is more formality and less flexibility especially in sourcing decisions. Mostly the relationship ET supply chain department has with key suppliers is transactional, non long term one. According to Chopra and Meindl (2007), building long term collaborative relationship enable supply chain members like ET to be more responsive to its internal and external customers as firms can collaborate with their suppliers in terms of information sharing, joint quality improvement programs, joint forecasting that will avoid demand and supply side risks. Table 4.5. presented the detailed result:

Table: 4.5. Practice of building long term collaborative relationship with key suppliers

	N	Mean	Std. Deviation
Treasuring long term collaboration with key suppliers	164	1.23	.512
Practice of collaborating with suppliers to share risks	164	1.25	.524
Practice of trust with key suppliers	164	.98	.645
responsiveness and leanness level due to trust and collaboration	164	1.00	.576
Overall mean value		1.11	.564

Source: SPSS output (2017)

4.5.2. Increasing knowledge about risk and risk analysis practices

With regard to practices that increase the knowledge about supply chain risks and enhance supply chain risk analysis and better understanding, the respondents agreed to moderate extent as shown by the overall mean value of 1.73. Considering the increasing supply chain risks, moderate extent level of practice is not enough for effective supply chain risk mitigation. This was also supported by the interview data in that; there is no practice of keeping supply chain risk register that clearly document expected supply chain risks together with their impact level and mitigation option. According to Musa (2012), proactive risk mitigation is possible when companies identify most significant supply chain risks and categorize and document them in terms of their likely occurrence, their risk impact level and mitigation strategies etc. however, such practices are almost none existing in ET's supply chain risk management efforts.

The level of awareness and culture about risk and their management is also in its infancy as evidenced by the smallest mean value of 1.62 given for the practices of increasing risk awareness and culture. According to sourcing manager of ET, there has been no training given to supply chain department staffs that deals with increasing the knowledge about supply

chain risks and the level of supply chain risk management culture is yet to be improved. According to Hopp et al (2012), many firms learn the value of reducing risks only after they have suffered through a disruption. But, when possible, learning from the experience of others is much more efficient. Studying previously occurred supply chain risk incidents is one way firms can increase their knowledge of risks and mitigation strategies. Forming consortiums and sharing information with suppliers, customers, and each other, is another way for ET to improve its staff knowledge and culture of supply chain risk management.

Table: 4.6. Practices of increasing knowledge about supply chain risk and risk analysis

	N	Mean	Std. Deviation
Supply chain Risks being known and documented	164	1.84	.619
Supply chain risk categorization-high, medium, low	164	1.73	.666
Level of risk awareness culture	164	1.62	.695
Overall mean value		1.73	.660

Source: SPSS output (2017)

4.5.3. Redundant stock/extra inventory arrangement practices

Regarding the practice of keeping extra inventory, respondents agreed that ET implement such practices to a great extent as evidenced by the overall mean value of 3.2. The practice of keeping stocks in such a way that costs are minimized has the largest variation in responses received as indicated by the standard deviation of 0.906, while the practice of keeping buffer stock has the least variation in response having standard deviation of 0.498. Maintaining additional stock, according to Hugos(2003), is an effective supply chain risk management practice in reducing demand and supply side risks since stocks give slack to the supply chain. The buffer stock arrangement is however, advised for items that have a low holding cost, long lead times, single-sourced and stocks that are not prone to being

outdate as pointed to by (Wilson,2007). Details of the result are presented below:

Table: 4.7. Practices of Keeping Redundant Stock

	N	Mean	Std. Deviation
Redundant stock arrangement-buffer stock	164	3.44	.498
Redundant stock arrangement-for long lead time, single sourced and critical items	164	3.29	.531
Redundant stock arrangement considering cost minimization	164	2.86	.906
Overall mean value		3.20	.645

Source: SPSS output (2017)

4.5.4. Supplier capacity assessment and qualification screening practices

On the supply chain risk management practices of supplier capacity assessment and qualification screening, respondents agree to moderate extent(with mean value 2.73) that they demand proof of business continuity from suppliers before signing a contract with them. Related practices such as assessing suppliers whether they bring potential disruption or not and practice of continuous supply chain auditing are implemented by ET to small extent as evidenced by mean value of 2.4 and 2.35, respectively. Details presented below:

Table: 4.8. Practices of conducting supplier capacity and qualification screening

	N	Mean	Std. Deviation
Supplier assessment for potential disruption	164	2.40	.698
Practice of continuous supply chain auditing	164	2.35	.689
Practice of requiring proof of business continuity from suppliers	164	2.73	.444
Overall Mean		2.50	.611

Source: SPSS output (2017)

4.5.5. Back up supplier arrangement practices

Regarding the practice of arranging and using back up suppliers, respondents indicated that, to a small extent ($0.5 \leq \text{mean} \leq 1.4$), ET uses back up supplier arrangement practices to manage supply chain risks arising as a result of possible failures from suppliers' due to various reasons such as if suppliers face a situation by which they cannot supply the required items due to reasons which are out of control for instance if the suppliers are in war zone area or face natural disasters or faced government sanctions etc. In some cases, according to the interview with sourcing manager of ET, representative staffs from sourcing and user departments visit the factory and warehouses of suppliers to check their capacity to supply and once agreed with framework agreement, ET simply send various purchase orders with the required amount of items to be supplied while the items were kept at the warehouse of suppliers, instead of at ET's warehouse. But such practices are in its infancy and there is a plan to continue and strengthen such practice. To a moderate extent, ET tends to use back up suppliers when previously selected suppliers caused previous disruptions and this is evidenced with mean value of 1.63.

Table: 4.9. Back up supplier arrangement practices

	N	Mean	Std. Deviation
Practice of maintaining back up supplier	164	1.14	.742
Practice of requiring capacity reservation contract	164	1.15	.753
Practice of using back up suppliers to avoid risk faced on previously selected suppliers	164	1.63	.934
Overall Mean		1.31	.810

Source: SPSS output (2017)

4.5.6. Supply chain contingency planning practices

One of the major supply chain risk management practice is developing and using supply chain contingency plan especially to reduce/mitigate the negative impact if supply chain risks be occurring and materializing. It is developed before the supply chain risk occurs but its implementation is when supply chain risks actually materialized. In this regard, the respondents agreed that the practice of developing and using contingency plan is implemented to small extent as evidenced by overall mean value of 1.3. The largest response variation was observed with regard to the practice of contingency plan development while small response variation received for the practice of using contingency plan to minimize loss and safeguard assets in times of risky incidents. The result reveals that the practice of developing and using contingency plan to manage supply chain risks is in its infancy. Supply chain contingency plans are very important especially in limiting if not avoiding the negative impact of supply chain risks when they actually occur. Therefore, it implies for managers to work more on contingency plans in their effort to mitigate supply chain risks.

Table: 4.10. **Practices of developing and using supply chain contingency plans**

	N	Mean	Std. Deviation
Practice of developing Supply chain contingency planning	164	1.23	.746
Practice of using supply chain contingency plan to minimize loss, safeguard assets	164	1.37	.483
Overall Mean		1.30	.614

Source: SPSS output (2017)

4.5.7. Practices of transferring Supply chain risks through Insurance

The last but not the least practice of managing supply chain risk is transferring supply chain risks through insurance. Obviously, insurance

doesn't avoid supply chain risks but enable companies to quickly recover from risky incidents. With regard to the practice of using insurance, the study indicates that ET uses insurance options to a great extent ($2.5 < \text{mean} < 3.4$) as evidenced by the overall mean value of 3.07. The practice of using insurance, to a great extent, as a key means of supply chain risk mitigation is confirmed by respondents with the smallest deviation in respondents' perception as evidenced by the standard deviation of 0.554. However, respondents provided hugely varied response (standard deviation 0.605) to the question whether ET constantly review and insure unforeseen insurable risks.

Table: 4.11. **Practices of transferring risks to Insurance Companies**

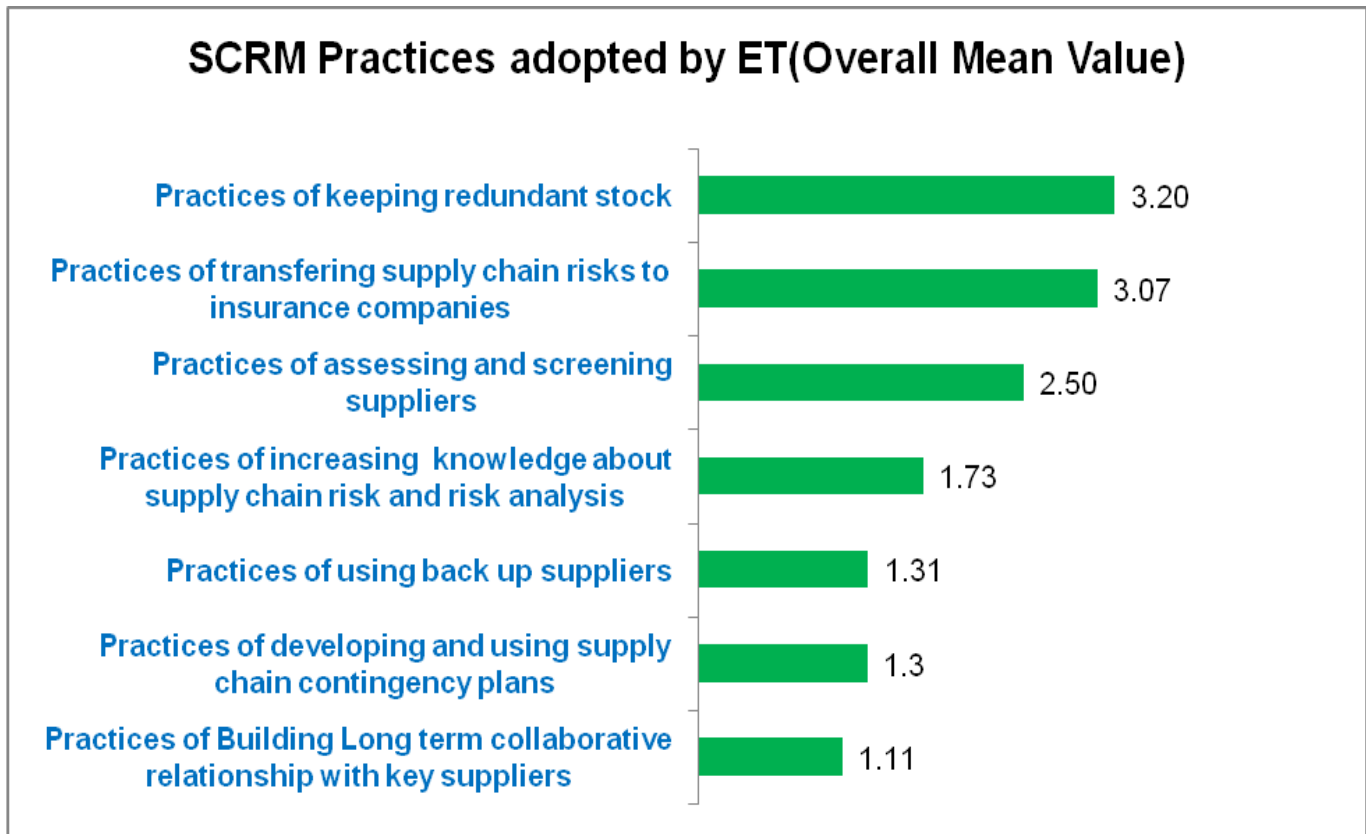
	N	Mean	Std. Deviation
Practice of using Insurance as key means of supply chain risk mitigation	164	3.29	.554
Practice of constantly reviewing and insuring unforeseen insurable risks	164	3.05	.605
Practices of using insurance to adequately compensate cases of disruptions	164	2.88	.562
Overall Mean		3.07	.574

Source: SPSS output (2017)

To summarize the extent of practicing supply chain risk management, the result of the study indicates that the practice of keeping redundant stocks is the most common practice respondents agreed that it is implemented to a great extent with the highest total mean values of 3.2. Similarly, transferring supply chain risks to insurance companies and practices of assessing and screening suppliers qualification practices are also practiced to a great extent with mean value of 3.07 and 2.5, respectively. The supply chain risk management practice which was implemented by ET to a small extent were practices of building long term collaborative relationship with key suppliers, practices of developing and using supply chain contingency plans and practices of using back up suppliers as evidenced by overall mean value of 1.11, 1.3, and 1.31, respectively. The study further revealed that the practices of increasing knowledge about supply chain

risks and risk analysis are performed by ET to a moderate extent with overall mean value of 1.73. The extent with which the major supply chain risk management practices are adapted by ET is summarized in the below figure 4.3.

Figure: 4.3. Supply Chain risk management Practices adopted by ET



Source: Based on SPSS output (2017)

4.6. Challenges of practicing supply chain risk management

To study the major challenges ET's supply chain department facing or faced while practicing supply chain risk management, the interview method was used to collect qualitative data from top managers of sourcing and supply chain department. The managers were purposely selected as they are the direct participant in developing and practicing supply chain risk management programs and strategies. Accordingly, the managers were asked to point out the major challenges they face with regard to the specific supply chain risk management practices discussed above: The practice of building long term

relationship with suppliers, practicing knowledge improvement and sharing about risks and conducting risk analysis, keeping redundant inventory practice, the practice of supplier capacity assessment and screening, practice of developing and using contingency plans and the practice of using insurance companies.

The response of the top managers regarding the question – *“what are the major challenges you are facing or have faced while practicing supply chain risk management?”* Is compiled using the following table:

Table: 4:12. Summary of Challenges of supply chain risk management practices

SNO.	Supply chain risk management practices	Major challenges faced or barriers not to practice it
1	Building collaborative long term relationship with key suppliers	<ul style="list-style-type: none"> ○ Lack of flexibility in decision making as public purchasing regulations require strict adherence to rule and regulations (sourcing and supplier relations) ○ Some Key suppliers not becoming consistent and reliable in their delivery and hence doesn't encourage having long term relationship (sourcing and supplier relations manager) ○ lack of shared understanding regarding the need to have long term collaborative relationship with key suppliers(supplier relations manager)
2	Risk management knowledge and culture development and sharing	<ul style="list-style-type: none"> ○ Lack of experts in the area of supply chain risk management(all 5 managers) ○ Lack of modern tools/software for assessing supply chain risks(sourcing and supplier relations managers) ○ Tendency to assume that supply chain risks are managed only by the department of corporate risk management only(corporate risk manager)

3	Keeping redundant inventory	<ul style="list-style-type: none"> ○ Technology effects as sometimes, new telecom technology comes and made some telecom devices irrelevant or useless due to incompatibility issue(warehouse manager) ○ Keeping redundant inventory based on incorrect demand from internal customers and lack of forecasting capabilities(sourcing managers)
4	Supplier capacity assessment and qualification screening practices	<ul style="list-style-type: none"> ○ The existence of non genuine suppliers in the market, sometimes very difficult to figure out such suppliers(supplier relations and sourcing mangers) ○ Changing performance of some suppliers make it difficult to certainly screen such suppliers(sourcing and supplier relations managers)
5	Back up supplier arrangement practice	<ul style="list-style-type: none"> ○ Lack of policy support as government policy is not flexible to use back up suppliers in case firstly selected suppliers fail, sometimes, ET is engaged in retender when the first supplier that won the tender failed to supply.(sourcing and supplier relations managers)
6	Developing and using Supply chain contingency plans	<ul style="list-style-type: none"> ○ The level of uncertainty involved in the supply chain operations as risk is about the future unknown-difficult to forecast unforeseen scenarios/Transport, logistics managers) ○ Lack of awareness regarding the usage of contingency plans for risk mitigation/ sourcing manager/
7	Transferring risk to insurance companies	<ul style="list-style-type: none"> ○ The limited availability of insurance policy coverage type in Ethiopia- mostly it is for physical insurable assets. For instance, there is no insurance that cover lost revenues due to network failure etc/ sourcing , corporate risk manager/ ○ Not reporting incident claims by user departments on time with important evidences/corporate risk manager/

8	Other practices includes: following company procedures in the strict sense to avoid costly errors that can cause disruptions on supply chain operations, to conduct sourcing based on already planned yearly requirements	<ul style="list-style-type: none"> ○ Some policies and procedures for instance sourcing procedures are not crystal clear in some issues causing potential errors on sourcing decision making/sourcing/ ○ User department's not requesting sourcing/warehouse/transport services as per their previously scheduled plan and budgets causing unexpected demand that may not be fulfilled./sourcing, warehouse and transport service managers/
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Source: Research Data from interview (2017)

To summarize the major challenges ET's managers faced while practicing supply chain risk management:

- *Lack of awareness, knowledge and culture about supply chain risks and their management practices*-Knowing and analyzing supply chain risks is critically important as indicated by Ritche and Brindley(2009) and Christopher and Lee(2004) to establish effective supply chain risk management practices. As indicated on the discussion about the extent of supply chain risk management practices, the company adapted practices of keeping extra inventory, using insurance and assessing suppliers' to a great extent but this are common supply chain management practices as they are not necessarily categorized purely as supply chain risk management practices. As indicated by Waters (2007), the management is the one to lead the staff in enhancing supply chain risk management knowledge and culture through the development and communication of mitigation strategies and more proactive practices, promoting information sharing, participation of employees, facilitation of trainings on supply chain risk management, leading by example, establishing a more formal supply chain risk management system supported by clear policy and procedures.

- *Suppliers side inconsistencies and unethical approaches*-This is a major challenge specially to practice long term collaborative relationship with key suppliers. As Kersten *et al*, (2007) pointed out lack of trust among supply chain members creates obstacle to build a collaborative relationship with supply chain members. Thus, inconsistencies and unethical approaches of suppliers can damage the trust that is highly required for collaborative and effective supply chain risk management.
- *Lack of supply chain risk management facilitators like Technology*- - facilitators like technologies that improve the visibility of supply chains according to Christopher and Lee (2004) are also important for today's lengthy and complex supply chain operations. In this regard, for instance, the company can use vehicle tracking technologies to control the movement of vehicle sand their fuel consumption,
- *Lack of flexibility in decision making/lack of relevant policy and procedure*- This challenge is associated with the very nature of the organization's ownership as ET is government owned, the company's decision making process lacks flexibility as it has highly rigid management system/governance like other government owned public organizations.
- *Limited insurance service and poor claim reporting*- the usage of insurance is more of traditional and well practiced by ET, still the insurance service available in the countries market is limited in terms of coverage types as some disruptions are not entirely compensated by insurance companies. As Lynch (2009) pointed out, the practice of transferring risks to insurance companies has also pointed out that it is challenging to cover the full extent of all risk incidents through insurance plus some incidents may be excluded by insurance companies from being fully covered by their policy. Poor claim reporting is more of internal problem issues that management can improve it through continuous communication and training.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.1. Introduction

The chapter covers five major sections. These include the summary of the findings, conclusion of the study, limitations encountered during the study, recommendations and suggestions for future research.

5.2. Summary of the major Findings

The study found out that, over the last five years, ET has faced the major categories of supply chain risks namely demand side risks, supply side risks, regulatory, legal and bureaucratic related risks, infrastructure and catastrophic risks. All supply chain related risks affected ET over the last 5 years but to a varying extent. Specifically, demand side risks (risks associated with volatile and unexpected demand) affected ET to a great extent, while supply side risks (suppliers being unable to deliver on time, unable to deliver the right quality, unable to deliver due to lack of capacity) and risks associated with the regulatory, legal and bureaucratic issues (new rules and administrative barriers such as foreign exchange availability issues) have affected ET to a moderate extent, while risks in relation with infrastructure and catastrophic events affected the company to small extent.

The study also revealed that ET, to a great extent, was engaged in practices of keeping extra inventory, transferring supply chain risks to insurance companies and practicing supplier assessment and qualification screening. The supply chain risk management practice which was implemented by ET to a small extent were practices of building long term collaborative relationship with key suppliers, practices of developing and using supply chain contingency plans and practices of using back up suppliers.. The study further revealed that the practices of increasing knowledge about supply chain risks and risk analysis were performed by ET to a moderate extent.

Regarding the major challenges ET has faced while practicing or to practice supply chain risk management, it is found out from managers of ET that they has faced the below major challenges:

- Lack of flexibility in sourcing decision making as more formality exist in the sourcing process which limits the possibility flexible collaborative relationship with suppliers
- Some key suppliers being less consistent and honest in their business limit the possibility of long term relationship with such suppliers
- Lack of awareness about supply chain risks and their management
- Lack of technology that increase the visibility of supply chains like GPS tracking etc
- Tendency to assume that managing supply chain risks is the responsibility of corporate risk management alone.
- Changing technological environment challenging the practice of keeping critical telecom items at central warehouse as after some times, some telecom items tend to be outdated due to new telecom technology coming.
- The limited insurance coverage types available in the insurance industry of Ethiopia.
- Lack of supply chain risk management policy or governance which guides supply chain risk management role and responsibilities.

5.3. Conclusion

This study concludes that the supply chain risks faced by ET over the last 5 years include demand side risks, supply side risks, regulatory, legal and bureaucratic risks, infrastructure and catastrophic risks but to a varying extent. To a great extent, ET has been affected by demand side risks (associated with volatile and unexpected demand from internal customers). To a moderate extent, risks associated with supply sides, regulatory, legal and bureaucratic issues had affected ET over the last 5 years.

The study also concludes that ET is engaged, to a great extent, in supply chain risk management practices of keeping extra inventory, transferring supply chain risks to insurance companies and practicing supplier assessment and qualification screening. However, practices of building long term collaborative relationship with key suppliers, practices of developing and using supply chain contingency plans and practices of using back up suppliers are implemented by ET to small extent. The study further concludes that the practices of increasing knowledge about supply chain risks and risk analysis are performed at moderate level.

The study further concludes that challenges to implementing supply chain risk management practices include Lack of flexibility in sourcing decision making, the existence of less consistent and unethical suppliers in the market, lack of awareness about supply chain risks and their management, lack of skilled experts in supply chain risk management, lack of technology that enable supply chain risk management, tendency to assume managing supply chain risks as the sole responsibility of the company's corporate risk management department, as more formality exist in government sourcing process which limits the possibility for flexible collaborative relationship with suppliers, changing telecom items in terms of technology, limited variety of insurance coverage types in Ethiopia, lack of supply chain risk management policy and governance.

5.4. Recommendations

On the basis of the findings and conclusions reached, the following recommendations are forwarded in order to improve the Supply Chain risk Management practices of the case company:

- ✓ The managements of the ET should keep on doing regular and systematic supply chain risk management practices as a way of mitigating adverse effects of uncertainty existing in its supply chains. ET need to be engaged in a continuous improvement of supply chain risk management practices

by benchmarking its sourcing and supply chain operations against the best players in the world.

- ✓ Furthermore, ET needs to work more to improve the practices of building long term collaborative relationship with its key suppliers. It needs to improve it from the traditional buy-sale relationship to a modern supply chain relationship through establishing strategic or long term relationship, contract, and continuous information sharing in order to minimize supply uncertainty and its associated supply chain risks. Because, having such long term relationship with key suppliers, ET will be benefited by obtaining its inputs with the right quality, right quantity and at the right time from such key suppliers and provide the required materials to its operation and customers as per their need.
- ✓ Besides, ET needs to improve its practices of developing and using supply chain contingency plans. Such contingency plans should be prepared before supply chain risks materialized but its implementation will be during the happening of risky incident as it enables to mitigate the negative impact of the incident.
- ✓ ET also needs to consider its weak practices of arranging back up suppliers so as to mitigate any risky incidents in an effective way. Reserving potential suppliers is also important in times of key suppliers failing to supply due to their own problems or due to reasons beyond their control.
- ✓ Most importantly, ET managers need to improve the understanding and culture about supply chain risks and their management practices by coaching staffs, providing training on supply chain risks, by establishing supply chain risk management policy and systems and empowering the staff.
- ✓ The management of ET is also advised to deal with the challenges that hinder the implementation of supply chain risk management practices.

Specifically, need to improve the awareness and culture of risk management practices, need to develop a policy and manual specific to supply chain risk management which should be prepared based on clear and formally known mitigation strategies. Besides, all the required human, material, technological resources relevant to the effective supply chain risk management should be considered to be fulfilled.

5.5. Limitations of the Study

The study focuses on supply chain risks affecting a given member of a supply chain- a firm and how a firm practice supply chain risk management. So, the study doesn't deal with the study of all supply chain members but focus only one company-Ethio Telecom (ET). The descriptive statistics method as well as the data used for the analysis is not sufficient enough to infer and generalize the findings or the conclusion beyond to the case company or to other public organizations operating in Ethiopia and the world.

Data collection was also limited by the busy schedules of the respondents. The researchers had to exercise utmost patience and make extra effort in reminding respondents and making constant follow-ups so as to acquire sufficient data from respondents. Some of the respondents approached were reluctant in giving some information fearing that the information sought would be used to intimidate them. The researcher handled the problem personally convincing and assuring respondents that the information will be treated as confidential and would be used purely for academic purposes. The other limitations was the fact that some respondents may not exactly remember actualized risk events or previous risk management practices of their company in the last 5 years. Besides, it is likely that some of the subjective responses obtained from the respondents may minimally affect the objectivity of the research inputs.

The fact that there is a limited/almost non available accumulated knowledge concerning similar studies on supply chain risk management practices especially on Ethiopian organization's inbound supply chain risks and their management

practices made the research process challenging but interesting one. The last but honest limitation is the fact that the student researcher lack thorough practical experience in conducting such research especially in the absence of related studies taking the case of Ethiopian public organization's supply chain risk management practices.

5.6. Suggestions for Further Research

This study was limited to one company case-ET, and hence its findings cannot be generalized to other public organizations in Ethiopia and else. What is more is that there is hardly available study conducted on supply chain risk management practices of other Ethiopian organizations and industries. Therefore, this study suggests similar studies to be conducted on other supply chain members operating in Ethiopia like public organizations and industries or on the supply chain risk management practices of a given entire supply chain network involving all supply chain members. Furthermore, the study does not end up with list of ultimate or universally agreed supply chain risk management practices that are exactly suitable for each of the major supply chain risks considered in this study. Therefore, the study suggest others to research further and attempt to develop best practices that are exactly suitable for effective mitigation of each of the supply chain related risks discussed in this study.

References and Bibliographies

- Adams, J., Khan, H.T.A. & Raeside, R., 2014. *Research methods for business and social science students*, New Delhi: SAGE Response.
- Addis, M. 2014. *A study on construction Contract Risk management practices in Ethiopian building construction projects*. Thesis paper. AAU. Addis Ababa.
- Adem. E. 2014. *Supply chain risk management practices and disruption control in power supply Kenya*. University of Nairobi.
- Altekar, R. 2005. *Supply chain management: concept and cases*. Prentice-Hall of India. New Delhi.
- Amemba, C. 2013. The Effect of Implementing Risk Management Strategies on Supply Chain Performance: A Case of Kenya Medical Supplies Agency. *European Journal of Business and Management*. Vol.5, No.14
- Anon, 2017. Risk. *Wikipedia*. Available at: <https://en.wikipedia.org/wiki/Risk> [Accessed May 10, 2017].
- Artebrant, A., Jönsson, E. & Nordhammer, M. 2003. *Risk & Risk Management in the Supply Chain Flow – A Case Study Based on Some of Marsh’s Client*, Master’s Thesis: Department of Industrial Management & Logistics, Lund University
- Boeyo, C. 2015. *Effects of Cyber Supply Chain Risk Management on Supply Chain Performance*. Thesis. University Saints Malaysia
- Blackhurst, J. Craighead, C. Elkins, D. and Handfield, R. 2005. “An empirically derived agenda of critical research issues for managing supply-chain disruptions,” *International Journal of Production Research*, vol. 43.
- Chopra, S. Meindl, P. 2007. *Supply chain management: strategy, planning, and Operation*. 3rd ed. Prentice Hall. New Jersey
- Christopher, M. 2011. *Logistics and supply chain management*. 4th ed. Prentice Hall. Harlow
- Christopher, M. and Lee, H. 2004 .Mitigating supply chain risk through improved confidence *International Journal Physics Distribution & Logistics Management*, 34(5), 388-396

- Christopher, M. Mena, C. Khan, O. Yurt, O. 2011. Approaches to managing global sourcing risk, *Supply Chain Management: an International Journal*, Vol. 16 Iss: 2, pp.67 – 81
- Cook, T. 2007. *Global sourcing logistics: How to manage risk and gain competitive advantage in a worldwide market place*. AMACOM. New York
- Craig R. Carter, Dale S. Rogers .2008. A framework of sustainable supply chain management: moving toward new theory. *International Journal of Physical Distribution & Logistics Management*, Vol. 38 Iss: 5, pp.360 – 38
- Creswell, J. 2009. *Research Design: Qualitative, Quantitative and Mixed Method*. Thousand Oaks, London and New Delhi: Sage Publications
- Faisal M., Banwet D. Shankar R. 2006. *Mapping supply chains on risk and customer sensitivity dimensions*. *Industrial Management & Data Systems*,106:878–895
- Fawcett, S. Ellram, L., Ogden, J. 2007. *Supply chain management: from vision to implementation*. Pearson Education. New Delhi
- Field, A. 2009. *Discovering statistics using SPSS*.3rd ed. Sage Publications. UK. London.
- Fraser, B. 2003.Managing risk proactively. *Journal of Strategic Finance*, 84 (10), pp 36–40
- Giunipero, L. C., & Eltantawy, R. A. 2004. Securing the upstream supply chain: A risk management approach. *International Journal of Physical Distribution & Logistics Management*, Vol. 34, pp 698-713
- Hallikas, J., Karvonen, I., Pulkkinen, U., Virolainen, V.-M. and Tuominen, M. 2004. Risk management processes in supplier networks. *International Journal of Production Economics*, Vol. 90, pp. 47–58
- Hessami, H. Savoji, A. 2011. Risk Management in Supply Chain Management. *International Journal of Economics and Management Sciences*. Vol. 1, No. 3
- Hopp, W. Iravani, S. Liu, Z. 2012. Mitigating the Impact of Disruptions in Supply Chains.In: Gurnani, H,Mehrotra,A. Ray, S.,(Eds.). *Supply Chain Disruptions: Theory and Practice of Managing Risk*. Springer. London.
- Hugos, M. 2003. *Essentials of Supply Chain Management*. John Wiley & Sons, Inc. New Jersey
- International Risk Management Institute. 2007. *Traditional risk management inadequate to deal with today's threats*. <https://www.irmi.com/articles/expert-commentary/traditional-risk-management-inadequate-to-deal-with-todays-threats>. Accessed on May 19, 2017. 3pm

- Juttner, U. Peck, H. Christopher, M. 2003. Supply chain risk management: outlining an agenda for future research, *International Journal of Logistics Research and Applications*, Volume 6, pp 197-210
- Khan, O. Bernard Burnes, B. 2007. Risk and supply chain management: creating a research agenda. *The International Journal of Logistics Management*, Vol. 18 Iss: 2, pp.197 – 216
- Kersten. W, Hohrath, P and Böger, M., .2007. An Empirical Approach to Supply Chain Risk Management: Development of a Strategic Framework. Hamburg University of Technology Schwarzenbergstr. Hamburg.
- Lynch, G. 2009. *Single point of failure: the ten essential laws of supply chain risk management*. John Wiley & Sons, Inc. New Jersey.
- Manuj I. Mentzer, T. 2008. Global supply chain risk management strategies. *International Journal of Physical Distribution & Logistics Management*, Vol. 29, No: 1, pp. 133-155
- March, J. Shapira, Z. 1987. Managerial perspectives on risk and risk taking, *Management Science*, 33, (11), pp. 1404-1418
- Mburu, D. Ngugi, P. Ogolla, K. 2005. An assessment of effect of risk identification management strategy on supply chain performance in manufacturing companies in Kenya. *International Journal of Economics, Commerce and Management*. Vol. III, Issue 4
- Minhan, Y. 1998. A measurement of statistical tools. *2nd international conference of environmental science and technology*. Vol.6
- Munyuko, C. 2015. Effects of Supply Chain Risk Management on Organization Performance: Case of Andy Forwarders Services Limited. *International Journal of Academic Research in Business and Social Sciences*. Vol. 5, No. 3
- Musa, N. 2012. *Supply Chain Risk Management: Identification, Evaluation and Mitigation Techniques*. Dissertation. Linköping University.
- Norrman, A. Jansson, U. 2004. Ericsson's proactive supply chain risk management approach after a serious sub-supplier accident. *International Journal of Physical Distribution & Logistics Management*, vol. 34, no. 5, pp. 434–456
- Ritchie, B. Brindley, C. 2009. *Effective Management of Supply Chains: Risks and Performance*. In: Wu, T. Blackhurst, J. (Eds.). *Managing supply chain risk and Vulnerability: Tools and methods for supply chain decision makers*. Springer. London.

- Sarpong, K. Alexander, O. Anin, E. 2013. An Assessment of Supply Chain Risks in the Cocoa Industry in the Ashanti Region, Ghana. *International Journal of Humanities and Social Science*. Vol. 3 No. 19; 2013
- Saunders, Mark. Lewis, Philip. Thornhill, Adrian. 2009. *Research methods for business students*. 5th ed., Pearson Education Ltd. Harlow.
- Sekaran, Uma. 2003. *Research methods for business, a skill building approach*. 4th ed., Jhon Wiley and Sons. New York
- Sheffi, Y. 2002. supply chain management under the threat of international terrorism. *International Journal of Logistics Management*, vol. 12, no. 1, pp. 1–11.
- Sodhi, M. Tang, C. 2009. *Effective Management of Supply Chains: Risks and Performance*. In: Wu, T. Blackhurst, J. (Eds.). *Managing supply chain risk and Volunerability: Tools and methods for supply chain decision makers*. Springer. London.
- Sodhi, M. Tang, C. 2009. Managing Supply Chain Disruptions via Time-Based Risk Management. In: Wu, T. Blackhurst, J. (Eds.). *Managing supply chain risk and Volunerability: Tools and methods for supply chain decision makers*. Springer. London.
- Sodhi, M. Tang. 2012. *Managing Supply Chain Risk*. *International Series in Operations Research & Management Science* .Volume 172. New York.
- Spring, M. & Stevenson, M. 2007. Flexibility from a Supply Chain Perspective: Definition and Review. *International Journal of Operations and Production Management*, Vol. 27, No. 7, pp. 685-713
- Tsion, Fekadesilassie. 2015. Risk management practices of Ethiopian commercial Banks. Thesis. AAU. Addis Ababa.
- Vikulov, V. Andrey Butrin, A. 2014. Risk Assessment and Management Logistics Chains. *Scientific Journal of Logistics*. 10 (1), 43-49
- Wagner, S. Bode, C. 2008. An empirical examination of supply chain performance along several dimensions of risk. *Journal of Business Logistics*, 29(1) pp. 307-325.
- Wagner, S. Bode, C. 2009. *Dominant risks and risk management practices in supply chains*. In: Zsidisin, G., Ritchie, B. (Eds.). *Supply Chain Risk: A Handbook of Assessment, Management, and Performance*. Springer. London.
- Wagner, S. Jean L. 2004. Configuring and Managing Strategic Supplier Portfolios. *Industrial Marketing Management*, Vol. 33, No. 8, pp. 717-730.

- Waters, Donald. 2007. *Supply Chain Risk management: Vulnerability and Resilience in Logistics*. Kogan Page. Cornwall
- Wieland, A. Wallenburg, C. 2012. Dealing with supply chain risks: Linking risk management practices and strategies to performance. *International Journal of Physical Distribution & Logistics Management*, vol 42, No. 10
- William, C. Heins, R. 1985. *Risk management and insurance*. McGRAW HILL International edition. New York.
- Wilson, M. 2007. The impact of transportation disruptions on supply chain performance, *Transportation Research Part E: Logistics and Transportation Review* 43(4):295-320.
- Winy, C., Wagoki, J. .2014. Analysis of the Significance of Risk Management Practices in Supply Chain Performance in Kenya: A Case Study of County Government of Kericho. *International Journal of Science and Research (IJSR)*. Vol. 3 issue 11. PP 85:91
- Wren, Buce. Stevens, Robert. Laudon, David. 2004. *Marketing research: Texts and cases*. JAICO publishing house. Binghamton.

ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATES
DEPARTMENT OF LOGISTICS AND SUPPLY CHAIN MANAGEMENT

Dear sir/Madam

My name is **Samuel Yoseph**. Currently, I am attending my MA in logistics and supply chain management at Addis Ababa University. As part of my study, I am conducting a research on ***supply chain risk management practices***. Accordingly, the below questions are prepared to gather information regarding practices of supply chain risk management. I assure you that your response will be treated with strict confidentiality. The outcome of this study will be used only for academic purpose.

Therefore, your genuine response to the questions is extremely vital for the quality and successful completion of the study.

Thank you in advance for taking your precious time to fill this questionnaire.

Section A- *Personal/demographic information*

1. In which section of the supply chain department do you currently work?

- Sourcing supplier relations logistics warehouse inventory Fleet management

2. Your highest academic qualification

- High school graduate college Certificate Diploma Degree Masters PHD

3. For how many years have you worked in ET's sourcing and supply chain department

- 0- 1 Year 2-5 years 6-10 years 11 + years

SECTION B: Extent of supply chain related Risks affecting ethio Telecom

To what extent has Ethio Telecom in the past 5 years experienced a negative impact in its supply chain operations and management due to the below listed supply chain related risks:

SN O	Supply Chain related risks	Not at all	Very small extent	Small extent	Large extent	Very large extent
	Demand side risks/DR/					
1	Unanticipated or very volatile internal customer demand.					
2	Insufficient or distorted information, orders or purchase requests or specifications from internal customers					
	Supply Side Risks/SR/					
3	Poor logistics performance of suppliers (suppliers failing to deliver on time)					
4	Supplier quality problems.					
5	Sudden default of a supplier (e.g., due to bankruptcy).					
6	Poor logistics performance of logistics service providers.(E.g. transport companies)					
7	Capacity fluctuations or shortages on the supply markets					
	Regulatory, legal and bureaucratic risks/RLBR/					
8	Changes in the political environment due to the introduction of new laws.					
9	Administrative barriers for the setup or operation of Supply chains (e.g., customs, new trade regulations, accessibility of foreign exchange).					
	Infrastructure Risks/IR/					
10	Downtime or loss of own production capacity due to local disruptions (e.g., labor strike, fire, explosion, industrial accidents).					
11	breakdown of internal IT infrastructure and systems (e.g., ERP system being down).					
12	Loss of own production capacity due to technical reasons (e.g., network server down).					
13	breakdown of external IT infrastructure.(E.g. customs', supplier's systems failure)					
	Catastrophic risks/CR					
14	Political instability, war, civil unrest or other sociopolitical Crises.					
15	Diseases or epidemics (e.g., SARS, Ebola Disease).					
16	Natural disasters (e.g., earthquake, flooding, extreme Climate, tsunami).					
17	International terror attacks					

Adopted from Wagner and Bode (2008, 324)

SECTION C: supply chain risk management practices

Please provide applicable information relating to the extent to which Ethio Telecom adopted the below supply chain risk management practices in its day to day operations:

supply chain risk management practices	S N O	Indicators of supply chain risk management practices	No Extent	Small Extent	Moderate Extent	Great Extent	Very Great Extent
Building long term relationships with key suppliers	1	The company treasures a long term collaborative relationship with its key suppliers.					
	2	The firm and its key suppliers collaborate in the areas of sharing risks.					
	3	There exist a considerable trust between the firm and its key suppliers.					
	4	The existing level of trust & collaboration supports responsiveness and leanness in the supply chain.					
Knowledge about risk and risk analysis practices/KR/	5	The key supply chain risks affecting the organization are known and documented					
	6	The process of risk management is all inclusive and participatory					
	7	The risks in the supply chain are categorized/profiled as high, medium & low					
	8	Risk awareness culture has been nurtured/matured in the organization					
Redundant stock/extra inventory arrangement/R S/	9	The organization maintains buffer stocks					
	10	Inventory is only maintained for long-lead time, single sourced & critical items					
	11	The buffer stocks are maintained within the confines of minimizing stock holding cost					
Supplier capacity assessment and qualification screening/SCA/	12	The company identifies the potential supplier disruption reports during vendor appraisals					
	13	The company undertakes continuous supply chain performance audits(quality, cost, delivery)					
	14	The company demands to see a proof of business continuity plans/performance bond/ before award of business					
Back up supplier arrangement Practice(BUS	15	The company maintains a backup supplier					
	16	The company has in place a capacity reservation contract (a secondary supplier guarantees amounts delivered up to the reserve capacity)					
	17	The backup supplier is picked in such a way as to avoid “share of similar disruption risk.”					
Supply chain contingency planning	18	The supply chain contingency planning is a critical element of the Business contingency planning					
	19	The plan contributes to loss minimization, safeguarding assets and risk mitigation.					
Transfer of supply chain risks to insurance companies	20	The company considers insurance as a key means of mitigating supply chain risks.					
	21	The unforeseen insurable risks are constantly reviewed and insured.					
	22	Recent cases of disruptions arising from insurable risks were adequately compensated.					

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የሎጂስቲክስ እና ሰጥላይ ጅምር ማኔጅመንት ዲፓርትመንት

ሰላም

ስሜ ሳሙኤል የሴፍ ይባላል። በአሁኑ ወቅት በአዲስ አበባ የንግድ ቤቶች በሎጂስቲክስ እና ሰጥላይ ጅምር ማኔጅመንት የሁለተኛ ዲግሪውን እየተከታተልኩ እገኛለሁ። በዚህ መሠረት በአሁኑ ወቅት በአቅርቦት ሰነድ ውስጥ የሚከሰቱ ያልተጠበቁ አሉታዊ ክስተቶችን (Supply chain related Risks) ለመቆጣጠር አትሎ ቴሌኮም የሚተገብራቸውን አሰራሮች አስመልክቶ ጥናት እያከናወንኩ ሲሆን ለጥናቱ ሊረዱ የሚችሉ መረጃዎቼንም እየሰበሰብኩ እገኛለሁ። በመጠይቁ ላይ የሚሰጡት መልስ/አስተያየት በጥብቅ ሚስጥር የሚጠበቅ ሲሆን ከመጠይቁ የሚገኘው መረጃም ለትምህርታዊ ጥናት ብቻ የሚውል መሆኑን አረጋግጣለሁ።

ስለሆነም የእርሶዎ ትክክለኛ ምላሽ/አስተያየት ለጥናቱ እጅግ አስፈላጊ መሆኑን ተገንዝበው ጥቂት ደቂቃዎችን በመውሰድ መጠይቁን እንዲሞሉልኝ በታላቅ ትህትና እየጠየኩ ለሚያደርጉልኝ ትብብር ከወዲሁ ምስጋናዬን አቀርባለሁ።

ማንኛውም ጥያቄ/ግልፅ ያልሆነ ጉዳይ ካልዎት እባክዎ ይህን አድራሻ ይጠቀሙ፡-

ሞባይል :- 0911-50-54-36

ኢሜይል :- samuel.yoseph@ethiotelecom.et

ክፍል ሀ- ጠቅላላ የግል መረጃ

1. በአሁኑ ወቅት በአትሎ ቴሌኮም ውስጥ የሚሰሩበት የስራ ክፍል

- ግዢ/ሰርሲንግ አቅራቢዎች ግንኙነት/ሰጥላይ ሪሌሽን ሎጂስቲክ ማእከላዊ መጋዘን/ዌርህውስ/ ትራንስፖርት

2. የደረሱበት ክፍተኛው የትምህርት ደረጃ

- ከፍተኛ 2ኛ ደረጃ ያጠናቀቀ የኮሌጅ ሰርተፍኬት ዲፕሎማ ዲግሪ ማስተርስ ዶክትሬት

3. በአትሎ ቴሌኮም ሰርሲንግ እና ፋሲሊቲ ዲፓርትመንት ያገለገሉበት የስራ ጊዜ/ልምድ ቆይታ

- 0- 1 አመት 2-5 አመት 6-10 አመት 11 + አመት



ክፍል ለ- በአቅርቦት ሰንሰለት ውስጥ የሚከሰቱ ያልተጠበቁ አሉታዊ ክስተቶች /supply chain related Risks/

ባለፉት 5 አመታት በአቅርቦት ሰንሰለት ውስጥ የሚከሰቱ ያልተጠበቁ ክስተቶች /supply chain Risks/ ምን ያህል ኢትዮ ቴሌኮም ላይ ተከስተው ተፅእኖ እንዳሳደሩ በገልፁ

ተ.ቁ.	ከአቅርቦት ሰንሰለት ጋር የተያያዙ ያልተጠበቁ አሉታዊ ክስተቶች	ጨርሶ ተፅእኖ አላሳደረም	በጣም በጥቂት ተፅእኖ አላደረገልኝ	በመጠኑ ተፅእኖ አላደረገልኝ	በስፋት ተፅእኖ አላደረገልኝ	በጣም በስፋት ተፅእኖ አላደረገልኝ
	ከአቅርቦት ጠያቂዎች ጋር የተያያዙ ያልተጠበቁ አሉታዊ ክስተቶች					
1	ያልተጠበቁ እና ደንገት የሚቀርቡ ያልታቀዱ የአቅርቦት ጥያቄዎች መኖር					
2	ባልተግለ/በተሳሳተ መረጃ ላይ የተመሰረቱ የአቅርቦት ጥያቄዎች የመቅረብ ሁኔታ					
	ከአቅራቢዎች ጋር የተያያዙ ያልተጠበቁ አሉታዊ ክስተቶች					
3	አቅራቢዎች የተጠየቁትን አቅርቦት አጓጉዘው በወቅቱ ያለማቅረብ ችግር					
4	አቅራቢዎች በተጠየቁት መሰረት ጥራት ያለው ምርት/አገልግሎት አለማቅረብ					
5	አቅራቢዎች በደንገት ውል ማፍረስ ለምሳሌ በኪሳራ ምክንያት					
6	የሎጂስቲክ አገልግሎት ሰጪ ድርጅቶች ለምሳሌ ትራንስፖርት አገልግሎት ሰጪዎች ጥራት እና ቅልጥፍና ያለው አገልግሎት መስጠት አለመቻል					
7	በገበያው ላይ በሚፈለገው መልኩ እና መጠን የማቅረብ አቅም ያላቸው አቅራቢዎች አለመኖር					
	ከመመሪያ/ህግ/የቢሮክራሲ ስርአት ጋር የተያያዙ ያልተጠበቁ አሉታዊ ክስተቶች					
8	በፖለቲካ ስርአት ለውጥ ወይም አዲስ በወጡ ደንቦች/ህጎች ምክንያት ያልተጠበቁ አሉታዊ ክስተቶች መኖር					
9	ለአቅርቦት ሰንሰለቱ ፍሰት እና ስራዎች እንቅፋት ሊሆኑ የሚችሉ አስተዳደራዊ መመሪያዎች/ደንቦች/አሰራሮች ለምሳሌ የውጭ ምንዛሬ አቅርቦት፣ የጉምሩክ፣ የገግዳህ ህግ፣					
	ከመሰረተ ልማት አቅርቦት ጋር የተያያዙ ያልተጠበቁ አሉታዊ ክስተቶች					
10	ምርት የማምረት ሂደት መቋረጥ/ወይም አቅርቦት ለማቅረብ በደንገት አቅም ማጣት ለምሳሌ በሰራተኞች አደማ፣ በአሳት አደጋ፣ በኢንዱስትሪያል አደጋዎች					
11	የድርጅቱ ውስጣዊ የመረጃ ቴክኖሎጂ ሲስተሞች መበላሸት ለምሳሌ አኦርፒ					
12	በደንገታዊ ቴክኒካል ችግር ምክንያት አገልግሎት ለመስጠት ወይም ምርት ለማምረት አለመቻል					
13	ውጫዊ ድርጅቶች የሚጠቀሟቸው የመረጃ ቴክኖሎጂ ሲስተሞች በደንገት መበላሸት ለምሳሌ የጉምሩክ ሲስተም፣ የባንክ ሲስተም ወዘተ..					
	ከመጠን ሰፊ ስው ስራሽ ተፈጥሮዊ አደጋዎች ጋር የተያያዙ ያልተጠበቁ አሉታዊ ክስተቶች					
14	የፖለቲካ አለመረጋጋት፣ ጦርነት፣ የእርስ በእርስ ጦርነት፣ እና ሌሎች ማህበራዊ እና ፖለቲካዊ ቀውሶች መከሰት					
15	ደንገተኛ የበሽታ ወረርሽኝ ለምሳሌ ኢቦላ፣አተት ወዘተ መከሰት					
16	የተፈጥሮ አደጋዎች ለምሳሌ- የመሬት መንቀጥቀጥ፣ ጎርፍ፣ አደገኛ የአየር ሁኔታ፣ሱናሚ ወዘተ መከሰት					
17	አለም አቀፍ የሽብር ጥቃት መከሰት					



ክፍል ሐ- ከአቅርቦት ሰንሰለት ጋር የተያያዙ ያልተጠበቁ አሉታዊ ክስተቶችን ለመቆጣጠር የሚረዱ አሰራሮች /Supply Chain Risk Management Practices/

ከአቅርቦት ሰንሰለት ጋር የተያያዙ ያልተጠበቁ አሉታዊ ክስተቶችን ለመቆጣጠር የሚረዱ አሰራሮችን አስመልክቶ ኢትዮ ቴሌኮም/የእርስዎ የስራ ክፍል የትኞቹን አሰራሮች እንደሚተገብር ቢገልፁ

ከአቅርቦት ሰንሰለት ጋር የተያያዙ ያልተጠበቁ አሉታዊ ክስተቶችን ለመቆጣጠር የሚረዱ አሰራሮች	ተ. ቁ.	አሰራሩ መኖሩን ሊያመለክቱ የሚችሉ ዝርዝር ነጥቦች	ጨርሶ የለም	በጥቂቱ አለ	በቂ በሚባል መልኩ አለ	በሰፊ ት አለ	በጣም በሰፊ ት አለ
ለረጅም ጊዜ የሚቆይ የትብብር ግንኙነት ከአቅርቦቶች ጋር የመፍጠር ተግባር	1	ለረጅም ጊዜ ከአቅርቦቶች ጋር የሚኖርን የመተባበር ግንኙነት ኢትዮ ቴሌኮም እንደ ወሳኝ ሀብት ይቆጥረዋል።					
	2	ሊከሰቱ የሚችሉ ያልተጠበቁ አሉታዊ ክስተቶች/ጉዳዮችን ከመቆጣጠር አኳያ ድርጅቱ ከወሳኝ አቅርቦቶች ጋር በጋራ ይሰራል።					
	3	በኢትዮ ቴሌኮም እና ለድርጅቱ በሚያቀርቡ ወሳኝ አቅርቦቶች መሀከል ሊታይ የሚችል መተማመን አለ።					
	4	በአሁኑ ወቅት ኢትዮ ቴሌኮም ከአቅርቦቶች ጋር ባለው ጠንካራ መተማመን እና መተባበር ምክንያት የድርጅቱ የውስጥ/የውጭ ደንበኞቹ በሚፈልጉት መልኩ(መጠን፣ጥራት፣ አይነት) አቅርቦቶችን እንዲያገኙ እንዲሁም ወጪን አንዲቀንስ አስችሎታል።					
ስላሳተጠበቁ አሉታዊ ክስተቶች ያለውን እውቀት ማዳበር እና ተያያዥ ጥናቶችን የማከናወን ተግባር	5	ድርጅቱ ላይ ተፅእኖ የሚያሳድሩ/ሊያሳድሩ የሚችሉ ጎጂ/ሊጎዱ የሚችሉ ጉዳት አምጪ ዋና ሁኔታዎች በስራ ክፍሉ ተለይተው እና ተመዝግበው ይገኛሉ።					
	6	ያልተጠበቁ ጉዳት አምጪ ክስተቶችን የመቆጣጠር ስራው ሁሉን ሰራተኞች ያካተተ አሳታፊ ስራ ነው።					
	7	ከአቅርቦቱ ሰንሰለት ጋር ተያይዞ የሚከሰቱ ያልተጠበቁ አሉታዊ ክስተቶች/ጉዳዮች በየደረጃቸው ተለይተው ይታወቃሉ፤ ለምሳሌ ከፍተኛ፣ መካከለኛ እና ዝቅተኛ ጉዳት አምጪዎች በሚል					
	8	ከአቅርቦቱ ሰንሰለት ጋር ተያይዞ የሚከሰቱ ያልተጠበቁ አሉታዊ ክስተቶችን/ጉዳዮችን አስመልክቶ የዳበረ ግንዛቤ/ባህል አለ።					
ተጨማሪ መጠባበቂያ አቅርቦቶችን በመጋዘን የማስቀመጥ አሰራር	9	ድርጅቱ አስፈላጊ አቅርቦቶችን በተጠባባቂነት የመያዝ አሰራር አለው።					
	10	በስቶር/በመጋዘን በኢነቨንተሪነት የሚቀመጡ እቃዎች የግዢ/የአቅርቦት ጊዜያቸው ረጅም ለሆኑ፣ ብቸኛ አቅርቦት ላላቸው እንዲሁም በጣም አስፈላጊ/ወሳኝ አቅርቦቶች ሊሆኑ ብቻ ነው።					
	11	የመጋዘን የመያዝ ወጪን በሚቀንስ/ባገናዘበ መልኩ ተጨማሪ አቅርቦቶችን ለመጠባበቂያነት በመጋዘን የመያዝ አሰራር አለ።					
የአቅርቦቶችን አቅም እና አፈፃፀም በየጊዜው የመገምገም ተግባር	12	አቅርቦቶች በሚገመገሙበት እና በሚመረጡበት ጊዜ በአቅርቦት ፍሰቱ ላይ ያልተጠበቁ ጉዳዮችን ሊፈጥሩ የሚችሉበት ሁኔታ/አድል ይገመገማል።					
	13	ድርጅቱ በመደበኛነት እና በተከታታይነት የአቅርቦት ሰንሰለት አፈፃፀም ምርመራ/ኮዲት ስራዎችን ያከናውናል ለምሳሌ ወጪ፣ጥራት፣ የማስረከቢያ ቀን ወዘተ አስመልክቶ..					
	14	ድርጅቱ ከአቅርቦቶች ጋር ውል ከመዋዋሉ በፊት ስራውን መስራት እንደሚችሉ የማስተማመኛ ማስረጃዎችን እና ሰነዶችን ለምሳሌ የአፈፃፀም ዋስትና/ፐርፎርማንስ ሰንደ/ እንዲያቀርቡ ያደርጋል።					
ተጠባባቂ	15	ድርጅቱ ተጠባባቂ ወይም ሊያቀርቡ የሚችሉ አቅርቦቶችን በመለየት					

<p>አቅራቢዎችን የማዘጋጀት አሰራር</p>	<p>16 በተጠባባቂነት የመያዝ አሰራር ይከተላል</p> <p>17 ከተመረጡ አቅራቢዎች አቅም በላይ ሊሆኑ የሚችሉ የኮንትራክት ውሎች ላይ ሁለተኛ ተጨማሪ ተጠባባቂ አቅራቢ ውል እንዲገባ የማድረግ አሰራር አለ</p> <p>17 ድርጅቱ በተጠባባቂነት ያስቀመጣቸውን አቅራቢዎች የሚጠቀሙ ከተመረጡ አቅራቢዎች ጋር በተያያዘ የሚከሰቱ ያልተጠበቁ ጉዳዮችን ለማስወገድ ሲባል ነው።</p>					
<p>የአቅርቦት ሰንሰለት መጠባበቂያ አማራጭ እቅድ በማዘጋጀት ያልተጠበቁ ጉዳዮችን የመቀነስ አሰራር</p>	<p>18 የአቅርቦት ሰንሰለት መጠባበቂያ አማራጭ የማቀድ አሰራር የጠቅላላው ቢዝነስ መጠባበቂያ አማራጭ እቅድ ዋና አካል ሆኖ ይካተታል።</p> <p>19 መጠባበቂያ እቅዱ ባልተጠበቁ ክስተቶች የሚፈጠሩ ጉዳዮችን ለመቀነስ እንዲሁም የንብረት/ሀብት ደህንነትን ለማስጠበቅ የሚረዱ ዝርዝር እቅዶችን ያካታል።</p>					
<p>የመድሀን ዋስትና አማራጮችን በመጠቀም የድንገተኛ እና ያልተጠበቁ ክስተቶችን አሉታዊ ተፅዕኖዎችን የመቀነስ አሰራር</p>	<p>20 ያልተጠበቁ አሉታዊ ክስተቶች/ጉዳዮች የሚፈጥሩትን አሉታዊ ውጤት ለመቀነስ ድርጅቱ የመድሀን ሽፋን አማራጭን በዋናነት ይጠቀማል።</p> <p>21 በመድሀን ሽፋን ውስጥ መካተት ያለባቸው የአቅርቦት/ንብረት/አገልግሎት አይነቶች በተከታታይነት እየተጠኑ እና እየተከለሱ የመድሀን ሽፋን እንዲያገኙ ክትትል ይደረጋል።</p> <p>22 በቅርቡ ተከስተው ለነበሩ ያልተጠበቁ ክስተቶች/ለምሳሌ የንብረት ጉዳዮች፣ ስርቆት/አደጋዎች መስሪያ ቤቱ በመድሀን ሽፋን በበቂ ሁኔታ ካሳ አግኝቷል።</p>					

Appendix 2- Interview Questions

Agenda	No.	Questions for supply chain management and corporate risk management department managers
Introduction	1	In which supply chain department are you currently working?
	2	With your current position, for how long have you served ET?
Understanding about supply chain risks	3	How do you describe supply chain related risks? Can you mention few examples?
Identification of supply chain risks affecting ET	4	Among supply chain risks, which ones affected your organization most over the last 5 years? For instance, from the below listed: supply side risks, demand side risks, regulated associated risks, infrastructure related risks, catastrophic risks etc or any other risks you faced
SCRM Practices	5	Pease describe your company’s risk management policy or governance or procedure specifically focusing on the management of supply chain risks?
	6	Please describe the overall supply chain risk management awareness and culture of your staff.
	7	In what areas, do the corporate risk management department support supply chain departments in their supply chain risk management practices? Is there enough support from corporate risk management department?
	8	Please describe your most common practices your department usually implement to mitigate supply chain risks? For instance, which ones of the following your department usually practice: building long term relationship with key suppliers, working on risk management knowledge, using back of suppliers, using redundant stocks, supplier capacity assessment practices, using insurance and contingency plans to mitigate risks If you have other practices...please explain it.
challenges faced and overall comment	9	What challenges have you faced in relation with your practices of supply chain risk management? For instance regarding the below possible supply chain practices- building long term relationship with key suppliers, working on risk management knowledge, using back of suppliers, using redundant stocks, supplier capacity assessment practices, using insurance and contingency plans to mitigate risks?
	10	What do you suggest for your supply chain departments to improve the overall supply chain risk or disruptions management practice of your organization?

Source: own

Appendix 3- Reliability Test SPSS Output

Reliability Statistics

Cronbach's Alpha	N of Items
0.71	21

Item-Total Statistics

Supply Chain risk management practices	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Treasuring long term collaboration with key suppliers	41.22	25.817	0.262	0.702
Practice of collaborating with suppliers to share risks	41.2	24.968	0.419	0.69
Practice of trust with key suppliers	41.47	27.367	-0.051	0.727
responsiveness and leanness level due to trust and collaboration	41.45	26.175	0.158	0.709
Supply chain Risks being known and documented	40.61	28.239	-0.18	0.736
Supply chain risk categorization-high, medium, low	40.71	29.899	-0.399	0.756
Level of risk awareness culture	40.83	30.412	-0.451	0.762
Redundant stock arrangement-buffer stock	39.01	24.129	0.626	0.676
Redundant stock arrangement-for long lead time, single sourced and critical items	39.15	25.701	0.271	0.701
Redundant stock arrangement considering cost minimization	39.59	21.14	0.658	0.652
Supplier assessment for potential disruption	40.04	23.194	0.559	0.672
Practice of continuous supply chain auditing	40.09	23.887	0.456	0.683
Practice of requiring proof of business continuity from suppliers	39.71	24.942	0.518	0.687
Practice of maintaining back up supplier	41.3	21.097	0.849	0.637
Practice of requiring capacity reservation contract	41.3	20.947	0.859	0.635
Practice of using back up suppliers to avoid risk faced on previously selected suppliers	40.81	23.847	0.298	0.699
Practice of developing Supply chain contingency planning	41.22	24.663	0.3	0.698
Practice of using supply chain contingency plan to minimize loss, safeguard assets	41.08	26.208	0.202	0.706
Practice of using Insurance as key means of supply chain risk mitigation	39.15	25.382	0.314	0.697
Practice of constantly reviewing and insuring unforeseen insurable risks	39.4	24.351	0.456	0.685
Practices of using insurance to adequately compensate cases of disruptions	39.57	27.842	-0.121	0.729

Cronbach's Alpha	N of Items		Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
0.78	2	Demand side risks				
		Demand side risk-Unexpected volatile demand	3.17	0.265	0.645	
		Demand side risk-demand based on distorted/insufficient information	3.33	0.345	0.645	

Item-Total Statistics

Reliability Statistics			Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
0.784	5	supply side risks				
		supply side risk-suppliers' poor logistic performance	8.99	4.552	0.662	0.707
		supply side risk-quality problems	9.09	4.857	0.521	0.766
		supply side risks-sudden default	10.18	5.742	0.779	0.712
		supply side risks-poor logistic performance of third party service providers	8.54	5.98	0.386	0.795
		Supply Side Risk- capacity fluctuation/shortage	9.32	5.251	0.598	0.731

Reliability Statistics

Item-Total Statistics

Cronbach's Alpha	N of Items		Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
0.789	2	Regulatory, legal and bureaucratic risk				
		Regulatory, legal and bureaucratic risk-change in the political and legal world	2.45	0.617	0.653	
		Regulatory, legal, bureaucratic risk-administrative barriers	2.08	0.552	0.653	

Reliability Statistics

Item-Total Statistics

Cronbach's Alpha	N of Items		Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
0.749	4	Infrastructure Risks				
		Infrastructure Risks-loss of capacity to produce due to local disruptions	3.54	2.041	0.6	
		Infrastructure Risks- failure of internal systems	3.46	1.661	0.816	
		Infrastructure Risks-unable to produce due to technical reasons	3.45	2.199	0.588	
		Infrastructure Risk-due to failure of external IT systems	3.43	2.959	0.216	

Reliability Statistics

Item-Total Statistics

Cronbach's Alpha	N of Items		Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
0.695	4	Catastrophic Risk				
		Catastrophic Risk-political instability, war, civil unrest	1.36	0.992	0.669	
		Catastrophic Risk- Epidemics	1.4	1.248	0.328	
		Catastrophic Risk- Natural disasters	1.55	1.01	0.567	
		Catastrophic Risk-Terrorism	1.82	1.291	0.383	

