



**FACTORS AFFECTING HUMANITARIAN SUPPLY CHAIN EFFICIENCY: THE
CASE OF INTERNATIONAL RESCUE COMMITTEE (IRC) – ETHIOPIA PROGRAM**

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**A thesis submitted to the Graduate School of Addis Ababa University School of Commerce
in partial fulfillment of the requirements for the Degree of Masters in Logistics and Supply
Chain Management**

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Addis Ababa

Declaration

I, the under signed, declare that this thesis in titled '*factors affecting humanitarian supply chain efficiency: the case of International Rescue Committee (IRC) – Ethiopia program*' is my original work and to the best of my knowledge has not been presented for a degree by any other person, and that all the sources of material used for the thesis have been duly acknowledged.

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This is to certify that the thesis carried out by Yosef Negero on the topic in titled: “*factors affecting humanitarian supply chain efficiency: the case of International Rescue Committee (IRC) – Ethiopia Program*” is his original work and is suitable for submission for the award of Master of Art Degree in Logistics and Supply Chain Management.

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Abstract

This study was conducted to investigate the relationship between factors affecting humanitarian supply chain (measured in terms of seven dimensions, namely lead time, information technology, supply chain policy, training and development, socio economic factor, institutional donors, and socio political factor) and supply chain efficiency in the International Rescue Committee (IRC) – Ethiopia Program. Owing to the small number of the total population, the study had employed census survey to quantitatively assess the supposed relationship between the dependent and independent variables. Questionnaire and purposive interview were used as the formal instrument of data collection. A total of 94 questionnaires were distributed and 78 of them were filled and returned to make the response rate about (82%). The findings identify major barriers to supply chain efficiency within the IRC; in particular, longer lead time, lack of training and development, absence of consistent information communication technology, socioeconomic factors, sociopolitical factors, donor factors, and repeated change of procedures have surfaced. The overall survey findings of this particular study revealed that the supply chain management function effort of International Rescue Committee – Ethiopia Program in relation to supply chain efficiency is moderate. The findings of the study also suggested that all the dimensions of factors affecting humanitarian supply chain have statistically significant relationship both with compounded and individual measures of supply chain efficiency, though the strength of the relationship is relatively higher in the case of lead time and socio economic factor. The regression result also suggested that information technology and socio economic factor have significant impact on determining IRC's supply chain efficiency. It is suggested that International Rescue Committee –Ethiopia Program shall give special emphasis in the improvement of its lead time, information technology and socio economic factor through an efficient streamlining of its supply chain processes, on the one hand, and implement a robust supply chain enabling software on the other. The organization should avail training and development program for supply chain department, establish offline software that can work parallel with the new system and should implement consistent long term contract in all locations with relevant potential suppliers for swift and reliable operation and to speed up the emergency response activities throughout the country.

Key words: Supply chain management, humanitarian supply chain, humanitarian supply chain efficiency, information technology, lead time, and supply chain factors.

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List of acronyms and abbreviations

ERP	Enterprise Resource Planning
GIS	Geographical Information System
GSC	Global Supply Chain
ICT	Information Communication Technology
IDI	Information Development Index
IFRC	International Federation of Red Cross and Red Crescent Societies
IRC	International Rescue Committee
IT	Information Technology
ITU	Telecommunications Union's
HSC	Humanitarian Supply Chain
HSCM	Humanitarian Supply Chain Management
JIT	Just-in-time
MSF	Médecins sans Frontières
NGOs	Non-governmental organizations
OCHA	United Nations Office for the Coordination of Humanitarian Affairs
PR	Purchase Requisition
RBV	Resource/Knowledge-Based Views of the firm
SC	Supply Chain
SOP	Standard Operating Procedure

UN	United Nations
UNDP	United Nations Development Fund
UNHCR	United Nations High Commissioner for Refugees
UNICEF	United Nations Children's Fund
USD	United States Dollar
WFP	World Food Programme
WHO	World Health Organization
WHS	World Humanitarian Summit
VFM	Value for Money
LT	Lead Time
BVA	Budget vis-à-vis Actual
Org.	Organization
ANOVA	Analysis of Variance
SPSS	Statistical Package for Social Science
EDI	Electronic data Interchange
POS	Point of Sales
RFID	Radio Frequency Identification
CRM	Customer Relationship Management
CPFR	Collaborative Planning, Forecasting and Replenishment
Dev't	Development

CHAPTER ONE

1. INTRODUCTION

1.1 Background of the study

Humanitarian supply chain is a process that integrates, coordinates and controls the movement of materials, goods and related information from suppliers and donors to meet beneficiary requirements in a timely manner. Humanitarian supply chain covers disaster relief as well as continuous support for developing regions. It is the process of getting aid in the form of goods and services to the beneficiaries requiring the goods (Fritz Institute, 2012).

Thomas (2004) explains that humanitarian supply chain entails the processes of planning, implementing and controlling the efficient, cost effective flow and storage of goods and materials as well as related information from the point of origin to the point of consumption for the purpose of alleviating the suffering of vulnerable people. The function encompasses a range of activities, including preparedness, planning, procurement, transport, warehousing, tracking & tracing, customs and clearance.

Relief organizations function in developing countries which rely heavily on acquiring goods, services, works and related resources for their operational supplies. The organizations face immense challenges in their supply chains and these challenges and bottlenecks tend to limit their operations and inhibit their ability to make the required humanitarian impact. This is a pressing concern since the implications of the non-efficient global chains will negatively impact the ultimate beneficiaries: people in need of humanitarian intervention. Humanitarian supply chains are the fundamental networks to provide physical aid to beneficiaries. Given such a magnificent mandate, humanitarian organizations require efficient logistical and supply chain network support (Lysons and Farrington, 2006).

Hoover, Eloranta, Holmström, and Huttunen, (2001) stated that the objective of supply chain management is efficiency improvements of the product delivery process from raw material suppliers to the end customer. The primary purpose for the efficient supply chain is to fulfill demand at the lowest possible cost.

When having an excellent Supply chain the company can provide products to its customers that are of high quality (De Meyer, Nakane, and Miller, 1989), at low cost (Goonatilake, (1990), within short lead-times (Haug, 1985) and give the requested customer support, (Hoover *et al.*, 2001).

The performance of the supply chain can have a significant impact on how quickly aid can be moved along the chain, so that it can be distributed to beneficiaries as quickly as possible. It is also important that the cost of providing aid is controlled, even though the main objective of aid operations is to get aid to people requiring it, this cannot be done without any regard to the cost of the operation. Money received from donors needs to be spent well and donors may want to see how that money is being spent. A number of different barriers that can affect how effective and efficient the supply chain performs. These include: understanding the supply chain process, poor infrastructure, poor communication, uncertainty in demand and supply, availability of resources, lack of knowledge and experience, lack of visibility of goods, underestimating the time necessary (Fritz Institute, 2012).

Though the nature of humanitarian supply chain is complex, there are some general areas of opportunities where improvements can be made to the performance of the supply chain so that it will contribute more if it perform functions like; Involvement in the disaster assessment process, communication, coordination and cooperation between aid organizations, supply chain preparedness, knowledge and use of processes and procedures, use of information technology, and managing the links in the supply chain (Fritz Institute, 2012).

International Rescue Committee (IRC) has been working in Ethiopia since 1999 G.C. and is implementing integrated, community-managed programs aimed at improving the quality of lives and recovery of livelihoods of disaster-affected populations through promoting individual participation, strengthening institutions and emergency response. IRC is working with communities in the following contexts: refugees in camps, local communities in under-served areas, and communities affected by natural disasters. Though the type and degree of involvement is different in different regions, IRC is currently working in Oromia, Benshangul Gumuz, Tigray, Somali, SNNPR, and Gambella regions. The major sectors of its operation are Environmental Health and Sanitation, Health, Child, Youth, Protection, and Development (CYPD), Community Wellbeing Initiative (CWI), and Emergency Rapid Response (ERR). Hence, IRC's programs

range from reliefs, which are provided in emergencies, refugee assistances and activities designed to strengthen the resilience of households against future shocks, such as drought and floods (IRC Ethiopia Profile Report, 2015).

The key to more efficient and reliable supply chain as per the organizations strategic planning is laying foundations for collaborative planning and excellent procurement practices. These need to be supported by better processes and systems and stronger learning and development. Key changes include: Developing a procurement system that will remove the need for paper and automate the approval and tracking process (the procure-to-pay system will track purchase requests, purchase orders, delivery receipts, invoice and payments); developing a collaborative planning pilot to reduce lead times and costs and improve quality; documenting market and supplier information, critical for every supply category; shifting to longer term agreements with suppliers to reduce transactional burdens; utilizing data to develop key performance indicators (The IRC Strategy 2015–2020, 2015).

This paper has discussed the basis of work undertaken to conduct, determine and analyze the factors affecting humanitarian supply chain efficiency with a view to getting to the root causes and ultimate sustainable solution. The study identifies, firstly, the factors which are most important to humanitarian aid organization supply chain in providing an effective response in crisis situations and community development activities, secondly, the variables which contribute to the efficiency of humanitarian organization named International Rescue Committee - Ethiopia Program.

1.2 Statement of the Problem

Better, safer and more efficient aid is the stated purpose of the first World Humanitarian Summit (WHS, 2016). With 60 to 80 per cent of humanitarian funding utilized by the supply chain, (Van Wassenhove, 2006), efficiencies must be found here, if the humanitarian organization, are to effectively meet ever increasing need.

According to IRC Strategy 2015–2020, the organization laid its vision over the next five years; it aims to become an operational leader through its work with partners and clients in the humanitarian field, and a thought leader that shapes public and humanitarian policies and practice. Its vision can be summarized as it will lead the humanitarian field by implementing

high-impact, cost-effective programs for people affected by crisis, and by using its learning and experience to shape policy and practice. The organization in order to achieve greater impact in its international work and in the U.S. has developed the following strategic objectives: improving the effectiveness of interventions, ensure the best use of resources, increase the scale and reach of work, knowledge and expertise, increase the speed and timeliness of support, and its responsiveness to the demands of its clients and communities.

Emergency logistics is often the largest and most complex element of relief operations (UNDP, 1993) and in order for successful supply chains to be effective there is a requirement for a clear understanding of the problems and issues involved. Improving supply chain efficiency requires uncertainty to be reduced, minimized, or even eliminated but in many business cases this may not be completely achievable due to the product involved (Mason, R., Towill, D., 1999; Christopher and Towill, 2001). Such problems are exacerbated in humanitarian aid context when the products become relief goods destined for communities of people either distressed or displaced as the result of a crisis outside of their control, and through which the supply chain will inevitably have to operate (Stephen, P. and Anthony, B. 2009).

In order to achieve best use of resources IRC's strategic objective pointed to debate efficiency of different interventions and the value of different outcomes with greater urgency. It also asserted that the organization wants to increase its impact as an organization and as a sector in four ways: Economy - buying inputs of appropriate quality at the right price; cost-efficiency - converting inputs into outputs in an efficient way; cost-effectiveness - converting outputs into outcomes in an effective way; and equity - distributing the benefits fairly (by gender, for example). It is also indicated that the organization will also explore methods for conducting cost-benefit analysis, which involves placing a monetary value on benefits. In attainment of its objectives the IRC pointed out all responsibilities of sub systems. These subsystems are the infrastructure and support operations, and among these let us see the supply chain sub system responsibilities: Supply chain systems - integrated up-to-date solutions that cover the full supply chain life-cycle processes, reporting needs and key performance indicators, and that reflect the IRC's critical dependency on efficient and effective delivery of commodities. The global supply chain team of IRC has set three-year goals to transform the organizations supply chain practices, processes and systems to make them more reliable, faster and cost-effective. This transformation will better

support its existing program delivery in protracted crisis and recovery contexts, and will particularly support the speed and timeliness objective in emergency contexts (The IRC Strategy 2015–2020, 2015).

In the Ethiopian country office, there are anecdotal evidences indicating negative consequences of internet connectivity and low broadband issues. For example, speed of the new database system in the organization is not swift, due to this it creates longevity in lead times of procurement objects, non flexibility of the system, and furthermore, the database is affecting productivity of supply chain performers (Seble, A. 2016).

Being an emerging field, there are no adequate empirical studies carried out on humanitarian supply chain. A good and more empirical researches need to be done in developing countries and by the researchers from these countries (Kovacs & Spens, 2009).

Kinyua (2013) observed that logistical delays were common and had an impact on humanitarian logistics performance (Kinyua, 2013). However, the study did not address other major factors of SC operation that influence efficiency.

Kim and Singha (2010) in their work in titled “WFP supply chain Capacity in Ethiopia”, asserted that, WFP is actively working towards increasing its supply chain capacity and efficiency of operations, to move forward to implement Google maps lead-time displays, defining metrics for transparency including key performance indicators and actively map programming, shipping and procurement process (Kim and Singha, 2010); however, their study did not show the major factors affecting the efficiency of humanitarian supply chain operation of the organization.

According to Endale (2016), in his study in titled “Assessment of humanitarian supply chain performance of selected humanitarian organizations in Ethiopia” concluded that specific factors influencing operational efficiencies of humanitarian organizations are agility, adaptability and alignment. However, the study did not address the information and communication technology, lead-time, organizational supply chain policies, socioeconomic and other factors which highly influence SC operational efficiency.

IRC Strategy 2015–2020 asserted that the organization’s supply chain and supporting functions faces some problems and need key changes; these key areas are: longer lead-time threat; procurement policy, compliance and oversight threat; cost–effectiveness threat; and operational capability threat.

According to the human resource reports of the IRC, turnover rate is increasing from time to time. The annual Human Resource workshop report (2015) of the IRC also depicted that the organizations reward system is poor especially in the areas of limited training and development opportunities, recognition mechanisms, and unsatisfactory work-life balance (Haimanot, 2017).

Considering the aforementioned research gaps the study has examined the factors affecting supply chain function efficiency of humanitarian organization in Ethiopia a case study of International Rescue Committee (IRC) – Ethiopia Program in 2018.

1.3 Research Question

The main research question of this research was to assess factors affecting humanitarian supply chain efficiency of International Rescue Committee - Ethiopia Program and the study has answered the following specific research questions:

- What is the level of the current supply chain efficiency in IRC Ethiopia?
- What are the factors associated with supply chain efficiency in the case of IRC Ethiopia?
- What is the relationship between different factors of humanitarian supply chain and supply chain management efficiency in IRC Ethiopia, and
- Which factor of humanitarian supply chain impact supply chain functions efficiency most in IRC Ethiopia?

1.4 Research Objectives

The study achieved the following general and specific objectives:

1.4.1 General Objective

The overall objective is to investigate the factors affecting humanitarian supply chain efficiency and level of supply chain efficiency in International Rescue Committee (IRC) – Ethiopia program, 2017.

1.4.2 Specific Objectives

The specific objectives of this study are:

- to examine the level of supply chain efficiency and associated supply chain factors in IRC Ethiopia,
- to assess factor associated with supply chain efficiency in the case of IRC Ethiopia,
- to determine the relationship between different factors of humanitarian supply chain and supply chain management efficiency in IRC Ethiopia, and
- to determine which factors of humanitarian supply chain impact supply chain operations efficiency most in IRC Ethiopia.

1.4.3 Hypothesis of the study

The study has notably revealed that there is significant statistical relation between supply chain management dimensions (the supply chain policy, longer lead-time, information technology, supply chain staffs training and development, socio-economic factors, donor funding and socio-political factors) and the efficiency of humanitarian supply chain operations.

1.5 Significance of the study

The study will provide an insight and will be used as a stepping-stone to other individual researchers who would like to carry out research works, not only on the specific subject, but also in the areas of supply chain management. The findings will also be applicable to other similar organizations in Ethiopia. As for its contribution to academics and theory, the study will provide

the basis for better understanding of the constitutive framework of factors for efficiency in humanitarian supply chain operation, and hence, contributes to the cumulative learning and knowledge building process in the area of humanitarian supply chain management. The finding will provide relief aid organizations in Ethiopia to have a yardstick to perform and make the required humanitarian impact in the domain of supply chain.

1.6 Scope of the study

The research was destined to focus only on supply chain management operation of IRC - Ethiopia Program. Due to the majority of IRC's supply chain sourcing are from local markets, this study did not cover the foreign supply chain of the organization. The research thoroughly looked at the level of the problem in relation to; information communication technology being used, socioeconomic factors, longer lead times, lack of proper training and development on supply chain, and supply chain policies, manuals and standard operating procedures, and other factors which focused on professional supply chain staffs of the organization. In doing so, the research addresses supply chain professional staffs in every geographical areas (field offices) of the organization carrying out supply chain operations.

1.7 Limitation of the study

In view of the limited resources and time available at the disposal of the researcher this particular study specifically covered the humanitarian supply chain management system of International Rescue Committee, who has been implementing emergency and development relief assistance programs in Ethiopia. Which means the study did not consider organizations and other stakeholders like, donors, host government, other supply chain actors etc.

Besides to this, the study will give an insight with respect to the research question and objectives specified above and not meant to address all the issues related to the humanitarian supply chain management operations of International non-governmental Organizations (INGOs) operating in Ethiopia.

1.8 Definition of terms

Supply chain: A company's supply chain is defined by Christopher (1998) as “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 hand of the ultimate customer”.

Supply chain management: Simchi-Levy (2000) defines Supply Chain Management as “ a set of approaches utilized to efficiently integrate suppliers, manufactures, warehouses, and stores, so that merchandise is produced and distributed at the right quantities, to the right locations, and at the right time, in order to minimize system wide costs while satisfying service level requirements”.

Logistics: Lambert *et al.* (1998) define it as “Logistics is that part of the Supply chain process that plans, implements, and controls the efficient, effective flow and storage of goods, services, and related information from the point of origin to the point of consumption in order to meet customer's requirements.

Supply chain efficiency: Efficiency is according to Beamon (1994) the measurement of how well the resources expended are utilized. Supply chain efficiency is how well the resources in the supply chain are utilized.

Disaster: is a “serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources”. (United Nations, 2009).

Drought: “The naturally occurring phenomenon that exists when precipitation has been significantly below normal recorded levels, causing serious hydrological imbalances that adversely affects land resource production systems”. (United Nations Convention to Combat Desertification).

Procurement: is management of sustainable acquisition of goods, works, and services to optimize value for money through a professional, auditable, and transparent framework.

Purchase requisition: is a document to clearly describe and communicate needs to sourcing.

Request for Quotation (RFQ) - supplier bids are solicited using request for quotation.

Request for Proposal (RFP) - are for more complicated procurements that may have multiple parts or require a statement of work and proposal to outline the requirements.

Bid Analysis (BA) - it summarizes and compares offers/proposals and provides a justification for the selection of a Supplier/Provider.

Purchase Order (PO) – it documents and confirms all details of a purchase to be made from a Supplier.

Delivery Report Form (DR) - documents that the IRC has actually received what it has ordered.

Payment Request Form – it authorizes payment to be effected to the supplier.

Sourcing: is the process of acquiring the inputs used to support production, day-to-day operation and associated activities.

Lead time: is the time between the placing of the order and the arrival of the shipment.

Humanity: is the provision of humanitarian assistance wherever it is needed and in a manner that respects and protects the dignity and rights of the individual.

1.9 Organization of the study

This study was organized into five chapters. The first chapter is the introductory part of the study which consists of background of the study, statement of the problem, basic research questions, objective of the study, significance of the study, scope and limitation of the study. The second chapter deals with review of related literature to this study. The third chapter discusses the research methodology. The collected data from the subject of the study carefully analyzed and interpreted under the fourth chapter. The fifth chapter presents summary, conclusions and recommendations on the findings of the study.

CHAPTER TWO

2. LITERATURE REVIEW

2.1. Theoretical Foundation

Building knowledge may be accomplished through a variety of approaches (Handfield and Melnyk, 1998). One method, and the one used in Shook, Adams, Ketchen, and Craighead (2009) paper, is to build knowledge by applying well-established theoretical bases outside of the discipline (Shook, Adams, Ketchen, and Craighead 2009). For example, Mentzer, Min and Bobbitt (2004) utilized several theoretical bases to create a “unified theory of logistics”. By viewing logistics through multiple theoretical lenses, each offering insights, they were able to offer a more holistic framework to guide future research efforts. We take a similar approach in this paper, but with different scope and intent.

By viewing strategic sourcing through multiple theoretical lenses, each offering unique insights, Shook *et al.* (2009) believe that they prove a more holistic framework to guide knowledge creation and application.

Shook *et al.* (2009) make the use of a number of well-established theoretical perspectives for purchasing and supply chain management as a basis for better understanding and explaining activities. Among these, below are selected by the researcher for reason they well serve for theoretical underpinnings of this research.

2.1.1. Institutional Theory

It explains how an organization’s environment, through regulative, normative and cognitive mechanisms, institutionalizes and legitimizes strategies (Scott, W.R., 1995). Although institutional theory and “neo-institutional” theory (e.g. March and Olsen, 1984) differ on whether organizational adaptation is the result of conscious decision processes made to conform to the organization’s environment (the latter ascribes more importance to such decisions), both predict that institutional pressures may cause the organization to adopt sourcing strategies that conform to its environment. Varying institutional pressures may cause organizations to source in different ways, which may have economic consequences and may lead to ethical dilemmas. Nonetheless,

it is important for firms to be within the range of legitimate sourcing strategies because a legitimate firm obtains resources of higher quality at more favorable terms than does an illegitimate firm (Deephouse 1999). On the other hand, if firms are too similar strategically, performance may suffer (Gimeno and Woo 1996). Thus, it would appear that firms should select sourcing strategies that help legitimate them, but do not lead to “isomorphism” (i.e. close duplication).

The new institutional theory has been illustrated as an open system perspective in contrast to the rational system as described by Scott (2003). The open system view of supply chain encourages the attention to the role of environment in the behavior of organization, its components, and its members. From the institution theory perspective, supply chain management should pursue two main goals: 1- monitoring the environment for collaborative opportunities, and 2- identifying the best practices in the industry and comparing the organizational operation with best practices, for continuous improvement (Scott, 2003; Movahedi *et al.*, 2009).

According to the institutional theory “external pressure”, play a major role in shaping organizational strategies associated with supply chain management. For example, strategies associated with the organizations’ choices of technology adoption and supply chain collaboration (Ketchen and Giunipero, 2004). However, since organizations are all monitoring their environment and try to adopt the best practices, it is expected that “organizations become homogeneous as a function of isomorphism over time” (Ketchen and Hult, 2007).

When making sourcing decisions, managers should be aware that whereas some strategies are rational for individual organizations, these same strategies are not rational when adopted by large numbers of firms (DiMaggio and Powell, 1983). Hence, managers should be careful to make sourcing decisions based on their strategic merit. Knowledge of the mechanisms of isomorphism may help identify sources of information for managers. To be more specific, regulative mechanisms, such as government policies and regulations, institutionalize and legitimize strategies (Scott, 1995). Accordingly, monitoring changes in government policies and regulations as they relate to sourcing decisions may allow a firm to be an early adopter of sourcing innovations.

The basic assumptions underpinning such models are that actors have bounded rationality and differing motivations and preferences, and that intra-organizational conflict is inevitable in

situations of joint decision-making. By viewing organizational buying behavior as a multi-actor, multi-agenda process, this literature conceptualizes buying decisions as being a potential locus of intra-organizational politics. This, in turn, highlights the possibility for power to be used to resolve conflicts of interest. Deciding what to buy, drawing up a specification, choosing a shortlist of potential suppliers, assessing the bids submitted and selecting a supplier are seen as intensely political rather than purely technical decisions. The literature also acknowledges, though, that decision-making conflicts can be resolved without the use of power, through problem-solving and persuasion.

A core idea common to these early models is that organizational buying behavior should be treated as a process, in which there are a number of phases or stages representing a sequence of activities. Robinson *et al.* (2002) encapsulated this in their ‘buy-grid framework’, which presents a number of what they termed ‘buy-phases’. All of these early models also suggest that there are contextual factors at three levels influencing the nature of buying decisions. At the first level there are environmental or situational factors, for example suppliers, competitors, technology, regulation, politics and culture. Second, there are organizational factors such as the buying organization’s size, structure, orientation, technology, reward systems and goals. Third, there are factors associated with the characteristics of different types of purchase or what Robinson *et al.* call ‘buy-classes’, such as product type, purchase novelty, purchase complexity and time pressure. Finally, all three models posit a number of variables or dimensions that are used to characterize the actors involved in organizational buying decisions, the ways in which they are expected to behave and the decision-making criteria they are expected to use. Tanner suggests that these early researchers are thus exploring three different questions: who participates, what happens and what causes or influences a specific decision?

The core concept drawing all of these strands together to explain variation in organizational buying behavior is the level of risk associated with a given procurement situation. Risk is seen as a function of purchase importance, complexity, uncertainty and time pressure, and the key antecedents of these variables are primarily found in the contextual factors discussed above: environmental, organizational and purchase characteristics. So, for example, purchase uncertainty might be related to uncertainty in the buying organization’s environment or to characteristics of the buying firm such as technical competence. Purchase importance might be a

function of the buying organization's size and the type of product or service being bought (e.g. capital equipment or supplies). Purchase complexity might also be related to the type of product or service and to the nature of the buying task (new spend or renewal of an existing contract). Finally, time pressure might be a function of the nature of the buying task.

2.1.2. Resource/Knowledge-Based Views of the Firm

The resource-based view of the firm (RBV) and knowledge-based view of the firm (KBV) are internally based theories designed to explain differences in firm behaviors and performance (Barney, 1991; Wernerfelt, 1984). Resource-based view proposes that firms have different resource endowments, and that the manner in which firms acquire, develop, maintain, bundle, and apply these resources leads to the development of competitive advantage and superior performance over time (Black and Boal, 1994; Teece, Pisano, and Shuen, 1997). Resource-based view doctrine prescribe that resources and capabilities (bundles of resources) need to be valuable, rare, inimitable, and organizationally activatable (firm has complementary resources to leverage and maximize capabilities) to drive sustainable competitive advantage (Barney, 1991; Black, and Boal, 1994). Knowledge based view theory was developed as an extension of resource-based view, and maintains that intangible and tacit resources such as human capital and knowledge are the only resources that are unique across firms over time, and therefore are the key components to competitive advantage (Grant, 1996, Kogut, and Zander, 1992).

From a more proactive perspective, resource-based view and knowledge based view tenets denote that firms may engage in outsourcing as a means of identifying, exploring, and transferring knowledge and resources from external sourcing partners to internal control.

In this perspective, firms may establish sourcing relationships with leading resource and knowledge providers in order to gain access to knowledge and resources not currently possessed internally. Under such conditions, sourcing can be viewed as a boundary spanning mechanism through which firms can use sourcing relationships to gain access to resources critical to the firm's competitive advantage development or maintenance (Combs and Crook, 2007). In such cases, firms establish a short-term relationship with an established sourcing partner with the intent of transferring knowledge, human capital, and other resources from the sourcing firm to the partner.

Mechanisms emphasized in this strategy can range from the transferring of knowledge to help develop internal capabilities, to the hiring of management personnel from the sourcing firm to develop internal capabilities for the partner, to the outright acquisition of the sourcing firm to internalize capabilities previously existing externally.

Firms may also choose to ally themselves with sourcing partners possessing complementary resources and capabilities as an alternative alignment to joint ventures and merger and acquisition activities. In such cases, sourcing partners may provide the combination of complementary knowledge bases with a lack of direct competition that can fuel research and development activities for innovative product and service development.

2.2. Conceptual Underpinning

2.2.1. Defining Supply Chain Factors

The critical success factors are the limited numbers of areas in which results ensure successful competitive performance (Alazmi and Zairi, 2003). Moe and Pathranarakul (2006) suggested critical factors that must be taken into considerations in managing disasters. They further explain that these success factors are the circumstances, facts, or influences that are inputs into management systems and can directly and indirectly affect the outcomes of a disaster management project. These factors are: effective institutional arrangement, supportive laws and regulations, effective information management system, competencies of managers and team members, sufficient mobilization and disbursement of resources, coordination and collaboration, and effective consultation with key stakeholders and target beneficiaries.

In its categorization of challenges to an efficient and effective supply chain Fritz Institute 2012, asserted that there are a number of different barriers that can affect how effective and efficient the supply chain performs. These include: Understanding the supply chain process, underestimating the time necessary, lack of knowledge and experience, availability of resources, poor infrastructure, poor communication, uncertainty in demand and supply, lack of visibility of goods.

The dominating characteristics that bring additional complexity and unique challenges to relief chain design and management according to Kovács and Spens (2012) are: unpredictability of

demand in terms of; timing, location, type, and size, suddenly-occurring demand in very large amounts and short lead times for a wide variety of supplies, high stakes associated with adequate and timely delivery, lack of resources (supply, people, technology, transportation capacity, and money), uncertainty, communications, degraded infrastructure, human resources, earmarking of funds. Furthermore, among barriers and difficulties on humanitarian supply chain, environmental challenges such as the unpredictability of disasters and the nature of funding make consequences in employee-turnover, well defining of manual processes, and weakness of the updated institutional learning which result inefficient and ineffective relief operation to beneficiaries. In addition, the external pressures on humanitarian aid and relief agencies from donors, local humanitarian organizations, governments and corporations, as well as the internal limitations that have impeded progress in humanitarian logistics, intensify these consequences (Thomas and Kopaczak, 2005).

2.2.1.1. Information Communication Technology

Information and Communications Technology (ICT) can be defined as the discipline “concerned with technology and other aspects of managing and processing information”: in other words, the use of electronic computers and computer software to convert, store, protect, process, transmit, and retrieve information (Hameed, 2007). The term also reflects the increasing use of mobile technology and its convergence with data gathering, storage and transmission; hence, the “C” in ICT. Today Information and Communications Technology (ICT) is impacting how the United Nations (UN), donor nation organizations, and the major international non-governmental organizations (NGOs) are delivering humanitarian services as part of disaster response and recovery. In some instances, ICT is seen as speeding the delivery and increasing the efficiency of disaster response and aiding in recovery. Furthermore, as the United Nations and the Humanitarian Response System looks past response to mitigation and to resilience, ICT skill development on the local level is being viewed as a way to meet the anti-poverty goals of the UN’s Millennium Development Goals (National Research Council, 2006).

Within the current state of technology in the field several types of technology relevant to response and recovery will be examined. The types of technologies are currently transforming the delivery of services and include: social and crowd sourced media, enterprise resource planning (ERP) software, logistics software, remote sensing and geographical information systems (GIS). ICT has become so important that many of the larger international organizations

are stepping into the role of venture capitalist and funding research and development in these areas; for example, the UNICEF Innovation Fund provides investment at the 25,000 and 100,000 range as well as 1million dollar grants for more mature ICT projects (UNICEF, 2017). Oxfam is another example having funding HELIOS, a supply chain management system the NGO has given to partners who could never afford such a project (Stephens, 2014; Helios Foundation, 2017).

In a case study by Blansjaar & Stephens (2014) Oxfam in 2013 was looking for an accessible and easy to use supply chain software solution that would allow the organization to automate its supply chain. Due to the organization's low IT literacy and inexperience with such solutions, Oxfam chose HELIOS for its solution based on usability (Blansjaar & Stephens, 2014, p. 59).

According to the International Telecommunications Union's (ITU) Information Development Index (IDI), Ethiopia ranks #147 out of 159 countries in terms of information access and technology (Adam, 2010). There are strong concerns that the investment in infrastructure and services that is required by the various information communication technology policies is not being made, which would obviously have a strong implication for the overall effectiveness (Adam, 2010).

Sirak (2012) has attempted to point some of challenges with respect to information communication technology among these, the most persistent challenges is the limitation of available infrastructure and technology. The landline technology for broadband provision within Ethiopia is substantially limited, and must be built up along with transportation and electricity infrastructure; this is a large-scale development project that has not yet been implemented (Chekol, 2009). According to Adam (2010) the effort to expand services was accompanied by a drop in the quality of broadband services.

In putting total economic impact of internet disruptions to countries, both in terms of number of days and total gross domestic product lost respectively Darrell M. West stated that Ethiopia has shut down internet for 30 days and lost about \$8,539,355.00. These disruptions lasted 753 days in total across 19 countries from 2015 through 2016. This lost money are, no doubt the cumulative prevalent inefficiencies of each International Nongovernmental Organizations and other organization (Darrell M. West, 2016).

Supply chains simply must be more efficient and effective so that goods, funds, and information can travel fast. Handfield and Nichols (1998) estimated that the costs of the flow of materials through the supply chain are approximately 75% of the total cost (eds. Cheng and Choi, 2010). Schnetzler and Schonsleben (2007) showed that information management has an impact on all target areas of SCM, that is, quality, delivery, reliability, delivery lead times, flexibility, assets, and costs (eds. Cheng and Choi, 2010).

According to ARC Advisory Group, the quest for efficient supply chains led companies worldwide to spend more than \$5 billion on supply-chain management technology last year, which expected to grow to more than \$7 billion by 2008. Even during global economic crisis, IT spending is still expected to grow at 2.3% in 2009 (Campbell, 2008). Recent developments in IT have significantly reshaped the supply chain behaviors in the last two decades. For example, Sarbanes-Oakley Act introduced in 2002 was affecting the way the firms formulate their supply chain's information technology strategies (Tirschwell, 2004).

Information is crucial to the performance of a supply chain because it provides the basis on which decisions are made. The same goes for quick response program. Quick response strategies are dependent on building long-term relationships, sharing information and investment in technology and facilities with suppliers (Birtwistle, Fiorito, and Moore, 2006).

IT strategy plays two important components in quick response program, namely to facilitate and maintain efficient and timely information sharing across the supply chain. Supply chain's success would then be dependent on the accuracy and velocity of the information provided by the supply chain members. Effective information systems allow not only the collection of data across the supply chain, but also the analysis of decisions that maximize supply chain profitability. The primary function of information technology in the supply chain is to seamlessly link the points of procurement, production, and delivery. This gives a significant benefit to the firm by greatly easing the ability to share information in a relatively quick and inexpensive manner (eds. Cheng and Choi, 2010).

Gunasekaran and Ngai (2004) argued that it is not possible to achieve an effective supply chain without IT, as it enables the management and exchange of information as well as the integration of the trading partners along the supply chain.

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Byrd and Davidson (2003) assume that the technical quality of IT and the utilization plan for it, and support by top management for IT development influence its impact on the supply chain, which in turn affects firm performance. Kent and Mentzer (2003) identify investment in inter-organizational IT as having an effect on logistics efficiency through relationship commitment. Wu, Cobzaru, Ulieru, and Norrie (1992) consider that the alignment and advancement of IT are positively connected to supply chain capabilities.

Bayraktar, Demirbag, Koh, Tatoglu and Zaim (2009) detected a significant positive connection between information systems practices and operational performance of small and medium enterprises, whereas Dehning *et al.* (2007) pinpoint a positive relationship between a firm's investment in IT based SCM systems and performance. However, research by (Vijayasarathy 2010) has been unsuccessful in identifying connections between information technology and IT use and performance.

Sanders and Premus (2005) executed a survey-based study measuring IT capabilities and supply chain collaboration and their effects on firm performance. Their results suggest that IT capabilities positively affect firm performance.

Closs, Swink and Nair (2005) argue that information systems would have a mediating role between the flexibility of logistics and performance, in the form of information connectivity.

The advancement of information and communication technology has been playing an important role in the facilitation of swift and reliable delivery of services. In today's globalized business environment, which is marked by stiff competitions, attaining customers' diversified and ever-changing demands would be a key to stay competent in the market, and this is determined by the firms' ability to employ the necessary technological support systems that would enhance the quality of their service delivery.

Information technology has increasingly contributing to the facilitation and smooth execution of supply chain schemes by creating effective integration among the actors that constitute that particular supply chain. In the context of supply chain management in general and procurement in particular, information technology's role has been emerged progressively.

Information Technology (IT) governance problems are critical success or failure factors for organizations that are IT dependent for information provision and business operations. Mengistu (n.d.) pinpointing the works of Sayana (2002) and Grutter (2010), stated that information systems (ISs) are the lifeblood of any large business. As in years past, computer systems do not merely record business transactions, but actually drive the key business processes of the enterprise. In such a scenario, senior management and business managers do have concerns about information systems (Sayana, 2002; Brown, 2006; Gruttner *et al.* 2010).

Recent IT developments and their impacts on quick response - popular information systems that have had a significant impact on the day-to-day supply chain operations include electronic data interchange (EDI) and point of sales (POS), RFID (radio frequency identification), enterprise resource planning (ERP), customer relationship management (CRM), and collaborative planning, forecasting, and replenishment (CPFR). The following subsections detail on how ERP development has affected quick response performance.

An ERP system can be defined as an information system for identifying and planning the enterprise-wide resources needed to take, make, ship, and account for customer order (Hodge 2002). It is a method of effective planning of all resources in an organization. It covers the techniques and concepts employed for the integrated management of businesses as a whole, with a goal to improve the efficiency of the whole enterprise (Ganesan, Hariharan, Praddeep, and Prakash 2001). Obviously, it comprises of a commercial software package that promises the seamless integration of all the information flowing through the enterprise – financial, accounting, human resources, supply chain, and customer information (Davenport, 1998). ERP systems are designed to model and automate many of the basic processes of an enterprise from finance to the sales floor (Ganesan *et al.* 2001), even though the degree of integration may vary from one scenario to another one. An ERP system is also a “configurable information systems package” that integrates information and information-based processes within and across functional areas in an organization (Kumar and Van Hillsgersberg, 2000). It helps to accomplish business goals by integrating the information system and helping the organization to work and move forward as a single entity (Ganesan *et al.* 2001).

An enterprise resource planning (ERP) system is a broadly used industrial term to describe the multi-module application software for managing an enterprise’s suppliers, customers, and

functional activities. ERP software systems are designed to link and integrate the various business processes of enterprises. An ERP system uses a single database and a common software infrastructure to provide a broader scope and up-to-date information. This allows the ERP system to integrate all aspects of the company, such as financial, production, supply, and customer order information. Companies can keep track of materials, orders, and financial status efficiently and coordinate manufacturing and inventory across different locations and business units. The industry views ERP system as a tool that enables them to have higher efficiency by enabling them to move financial and other data speedily from one department to another department (Holt, 1999). ERP software can also be used to integrate internal business activities of a multi-facility organization, or enterprise, to ensure that it was operating under the same information system to achieve better coordination across the supply chain. Furthermore, ERP software can also support operations functions such as production scheduling to enable company to quickly respond to customers' demand, high quality of product, reliable delivery, etc. (Metaxiotis, Psarras, and Ergazakis, 2003). For example, Microsoft Window's client based and object-oriented quick response tool was designed to "augment ERP applications with more precise and constraint-based scheduling of both materials and resources" (Hickey, 1999).

Although the system promises significant benefits, this, however, comes with big costs and risks. ERP implementation requires flexibility and risk tampering as the project cannot be completed within a short period of time; in fact, it is an ongoing process. ERP systems are complex, and implementing the system can be a difficult, time-consuming, and expensive project for companies. Implementation can take many years to complete and cost tens to hundreds of millions of dollars. Moreover, even with significant investments in time and money, there is still no guarantee of the outcome (eds. Cheng and Choi, 2010).

ERP systems have continued to evolve in the twenty-first century. ERP systems are also designed to take advantage of Internet technology, and users are able to share information and communicate via the Internet. By the second generation of ERP (ERP II), vendors had learned to create Web-centric systems by consolidating data and allowing dynamic access from various clients. One of the latest developments is the integration of e-business capabilities to use the internet to conduct business transactions, such as sales, purchasing, inventory management, and customer service. ERP systems provide vast amounts of data for analysis. Software vendors have

developed powerful new analytic tools and applications that capitalize on ERP's central repository of data. ERP aims to improve internal efficiency by integrating the different parts in the organization. The proliferation of ERP systems forces companies to provide communication and information flow between supply chain agents, overcoming natural boundaries (Tarn, Yen, and Beaumont, 2002).

It is not an exaggeration to say that quick response has not fully exploited to the changes in information technology. By using the available information in a superficial manner, the companies are not taking full advantage of the information available to them. The main reasons for such an incomplete use of information are as follows: Supply chain design: The strategic design of a supply chain (e.g., location and number of facilities, operating policies) has been determined long before the information was available. Now that the information is available, to make the best use of it, it may be necessary for the supply chain to be redesigned. Many companies have failed to recognize this need for redesign and have instead decided to stay with the old design while trying to make the best use of the available information. As a result, quick response captured only a fraction of the IT benefits. Decision making process: It is reasonable to say that most of the decision making in the current supply chains is very much manual as well as subjective, and makes very little use of a rigorous and automated decision making process. As a result of this manual interaction, the voluminous data that has recently become available cannot be analyzed, interpreted, and incorporated into the decision making process. This in turns hinders a speedy decision making on new customer's demand and requests. Existence of supply chain *metrics*: One of the major issues associated with any supply chain collaboration project is the manner in which the benefits will be shared among the participants. To achieve a mutually agreeable sharing of the benefits, one must be able to exactly compute the benefits associated with a particular strategy. In the current state of affairs, the financial picture at most companies is so muddled (with significant time lag) that it is almost impossible to determine the improvements realized from a supply chain collaboration endeavor. If the information-based collaboration is to proceed, the issues associated with quick response and SCM metrics must be adequately addressed. Based on the observations detailed above, it is imperative that companies address some or all of these issues before we can say that the IT-based revolution is complete. In the presence of information, it is necessary for companies to change the design and management of their supply chain to better support the quick response program. As such they should obtain the

ability to evaluate alternative supply chain strategies available, pick the one that is most information compatible. The companies must also develop a user-friendly, automated, rigorous decision making process with as little human or subjective involvement as possible. Such an approach will be better able to handle the voluminous data that is being transmitted across the supply chain. The in-built algorithms should be able to automatically incorporate the information and produce the appropriate decisions. In addition, they must be in a position to accurately and in a timely manner calculate their financial position (eds. Cheng and Choi, 2010).

With these features of an ERP system, it is crystal clear that it has very good potential to be applied in the textile and clothing industry. However, ERP system projects are also notorious for its high failure rate, and even big name companies (such as Nike), which have spent a huge amount of investment, would fail. As a result, it is important for us to identify the main barriers and challenges in implementing and using ERP system in the TC industry. Measures, especially those which employ technological innovations, could hence be proposed (eds. Cheng and Choi, 2010).

The main purpose of implementing an ERP system is to achieve integration and coordination both within the company and across the industry. This will in turn lead to cost reduction and hence profitability improvement (Koch, Slater, and Baatz, 1999). With successful implementation, the ERP system's influence is immense. However, there is no guarantee for success (eds. Cheng and Choi, 2010).

The development of information and communications technology (ICT) has created new possibilities for improving firm performance. Brynjolf and Hitt (2000) reviewed the evidence on how investments in (and thus the increased use of) IT influences performance. As part of their definition, Simatupang and Sridharan (2005) include information sharing as one of the dimensions of supply chain collaboration. Assuming that supply chain collaboration has a positive effect on firm performance, the Simatupang and Sridharan (2005) framework can be interpreted such that increased information systems support is linked to better performance by enabling deeper supply chain collaboration.

2.2.1.2. Organizational SC Policies, SOPs and Manuals

Many organizations have found it useful to prepare logistics manuals as a guide to company personnel. These act as a guide for employees in other departments and, for suppliers. Manuals describe the procedures to be adopted to achieve particular purposes and the rules for making particular decisions. They will also usually contain information about job responsibilities and reporting relationships, inform people about the service provided by the department and service as a guide to departmental policies regarding such issues as business ethics. The objective of such a manual is to provide a clear statement of how things are to be done and it is a useful help to newcomers. Also, it can help to resolve disputes. The drawback with this approach, however, is that it might lead to a stifling of initiative and reluctance to tackle new problems which do not seem to be covered by the manual. Thus it is possible to argue that an operating manual is a more useful device in relatively static conditions, but less appropriate in a rapidly changing environment in which old methods and procedures may quickly become ineffective (Michael Quayle, 2006).

Grace and Fridah (2015) asserted that managing spends creep and ensuring cost containment is often a challenging task. Organizations need to have a strong team and capability across end-to-end sourcing and procurement process to ensure costs are contained. Without a dedicated team to run a quality-sourcing event, requirements are often not accurately captured or scrutinized and money is wasted on unnecessary high-specification products and services. Without a dedicated team at the other end of the source to manage process and supplier adherence to contract, scope creep becomes an issue.

The ability of the organization to develop and apply effective purchasing policy depends partly on the perceptions of managers at all levels. The manager charged with the development of a policy should recognize that these perceptions are affected by the existing company structure, the quality of its internal communication system, the past experience of the company and its managers, and the resources available. Development of a policy involves companywide considerations. These considerations differ by industry and by company. What should be common, however, is the need to develop advantages over the competition and use them effectively. The ability of the organization to develop and apply effective purchasing policy will be conditioned by several factors, and there are roles for a purchasing manager that relate to the

development of policy. Among these are: generating alternative solutions to procurement problems, protecting the cost structure of the organization, minimizing purchasing costs, assuring long-range sources of supply, and maintaining good relationships with suppliers (Michael Quayle, 2006).

According to Kovács and Spens (2012), in recent years in an endeavor to improve the efficiency of their purchasing and acquisition procedures, a number of the major aid agencies such as UNICEF, UNHCR, IFRC have introduced 'frame agreements' for supply. These agreements set out clear criteria that the aid agencies require from suppliers in terms of price guarantees, quality standards, volume capabilities and required inventory holdings. They have also permitted a rationalization of the supplier base in that only a limited number of suppliers will be included within any frame agreement. From the point of view of the aid agencies such agreements are a positive step in improving their purchasing procedures compared to previous arrangements of competitive tendering in relation to individual requirements.

Grace and Fridah (2015) asserted in their study that procurement policies in humanitarian organizations should be streamlined by the policy makers in such organizations to ensure that they do not inhibit delivery of critical services. Furthermore, their study claimed that humanitarian organizations should invest in information technology. This will ensure that the procurement processes are made more efficient towards aiding service delivery.

According to Pan American Health Organization (2001) clearer and more specific purchase requisitions, the sooner the needed supplies will arrive and the more useful they will be. Misunderstandings can crop up when requesting emergency supplies, particularly when it comes to technical aspects. Among all considerations clarity is highly associated with the lead time of the acquisition; hence, requisitions should be clearly phrased, including all the details needed to identify the supplies wanted. The use of catalogs or any other kind of illustration, including drawings if needed, is always recommended to eliminate possible ambiguities. Once again, technical advice is called for when requesting supplies, especially in the case of unfamiliar products.

Procurement processes and policies in IRC - Procurement activities of IRC are conducted in an open and impartial way, focusing on transparency, adequately testing the market, avoiding

biased specifications and treating all suppliers equitably. In that way, confidence of donors and vendors is strengthened. All procurement activities have to comply with all donor regulations in order to increase their transparency. (IRC, Procurement Manual for International Programs, 2015).

The procurement process at IRC includes the following steps: purchase request (PR), request for quotation / Request for proposal, bid analysis (BA), submission of the purchase order or contract with the selected supplier, delivery report (DR) and/or certificate of completion, payment request form (IRC, Procurement Manual for International Programs, 2015, p.12).

A procurement tracking system is used in order to provide information about the status of the order, detailed description about the suppliers' performance, a background of the organization's business with the suppliers, ensuring the quality of the items which delivered and the duration of the delivery of goods. Procurement thresholds in IRC - The following chart outlines IRC's standard procurement thresholds. If an IRC donor requires lower thresholds for any type of procurement, the donor requirement takes precedence over IRC's threshold. The IRC requires a minimum of three quotes for all procurement valued \$2,500 USD or higher, unless the procurement is made under a valid Master Purchase Agreement (frame agreement) (IRC, Procurement Manual for International Programs, 2015).

Figure 2.1: IRC procurement processes and policy

Value	Below \$500	\$500 to \$2499	\$2500-\$19,999	\$20,000 and above
Required forms	PR, DR*	PR, PO, DR*	PR, RFQ, PO, BA, DR*	PR, RFP, PO or contract, BA, DR*
Procurement method	Direct, Limited	Direct, Limited	Direct (CS**), Limited, Open	Open or Open Int'l, Direct with MPA
Evaluation method	Best practice	Best practice	Bid Analysis	Bid analysis, committee

*A Delivery Report should be used as proof of delivery for the procurement of goods. For the procurement of services and works, a certificate of completion should be used.

**CS = MPA or Contracted Supplier

Source: IRC, Procurement Manual for International Programs, 2015

2.2.1.3. Training and Development

Successful training and development policies will enable the organization to attract and retain able people. In today's rapidly changing world, with developments in knowledge and techniques, it is also important that staffs at all levels in the organization are provided with facilities to keep up to date. Better trained staff will give a better performance. No longer can organization rest content that employees have received sufficient education and training before entry into the organization. Many organizations have developed a training department to help in this area and to assist departmental managers in devising the right policy. A number of steps are important in developing and supervising training. The first task involves identifying the training needs of individuals. An assessment of individual strengths and weaknesses in relation to existing and possible future jobs is a starting point. The emergence of new knowledge, new techniques and

new legislation must also be monitored. Having analyzed the needs, a program of how these training needs can be met must be drawn up. The training program, once in operation, must be evaluated in terms of the benefit accruing to the individual and the organization. In discussing the various types of education and training that can be given, it will be useful to distinguish between in-house or internal training and external training, although some schemes combine aspects of both (Michael Quayle, 2006).

As well as recruiting people with particular knowledge, skills and expertise, it is important that people are provided with training to maintain and improve their knowledge and skills. Most of the organizations have specific training for improving the quality of their human resources in emergency response, in all technical areas such as logistics, health or water and sanitation. As well as recruiting and training full time employees, the access to and the use of volunteers provides organizations with people with particular expertise and experience. Most humanitarian organizations have a high staff turnover rate. Recruiting and training people is a costly, time consuming activity. It is therefore, important to identify the reasons for staff turnover and to ensure that recruitment and training processes are effective and efficient (Fritz Institute 2012).

Inadequate training in humanitarian logistics has also been highlighted in literature (Thomas and Kopczak, 2005; Perry, 2007). That said, neither the lack of collaboration across humanitarian organizations nor the lack of recognition of logistics in the humanitarian context is unique to Africa. Yet the low recognition of logistics is surprising given the large share of logistical costs in humanitarian aid (van Wassenhove, 2006).

Michael Quayle (2006) asserted that in an established organization structure, a periodic audit of company resources essentially must include a survey of personnel in terms of adequacy of numbers and skills to meet the needs of changing programs. A responsibility rests, therefore, with the departmental manager to determine the effect of corporate plans on the department and in conjunction with the personnel department to arrange participation in the training and development program and for recruitment where necessary.

Humanitarian logisticians possessed are too much of administrative and functional. Henceforth, a number of additional skills on top of the T-shaped model of commercial logistics skills are required. These are the skills logisticians would need to develop before entering the humanitarian

field. Unfortunately, the logisticians come from diverse and varied backgrounds and acquired their humanitarian skill through trial and error (Thomas and Kopczak, 2005). Training and development is a key challenge for procurement organizations. That include: skill development; the right recruiting and retention practices; and career paths in other functions outside of procurement (Gocke, 2008).

2.2.1.4. Lead Time

Many firms have been observed to evaluate performance, primarily on the basis of cost and efficiency (Skinner, 1971). Besides the financial measures, we now have the non-financial measures which include time, quality and flexibility. Time element has strategic importance in business and hence time has to be used as a strategic metric in performance measurement (Stack *et al*, 1990) (Ira Haavisto, (2014). Kovács and Spens (2012), asserted that as time is crucial during an emergency response, the military and humanitarian community need to avoid parallel efforts and duplications along the supply chain by combining their efforts and activities with other stakeholders.

Joint contingency planning helps reduce lead times and avoid reliance on expensive transport options (e.g. airlifting) or last minute sourcing (Heaslip *et al.*, 2007b). This planning further helps in the development of alternative plans and ensures the mobilization of the right range of relief items.

There are two different times that are important in humanitarian supply chains. These are; ‘Response Time’ and ‘Beneficiary Delivery Time’. Response Time is the overall time taken for goods to flow along the supply chain. Beneficiary Delivery Time is the time from when it is identified that beneficiaries need goods, until they receive them (Fritz Institute, 2012).

2.2.1.5. Socio-economic Factor

Socio-economic situational factors, such as the type of market economy, the presence of local suppliers, the level of education of the population, the local culture and religion will oblige relief organizations to adapt their operation to the context, and can affect the performance of humanitarian logistics (Altay *et al.*, 2009; Dowty and Wallace, 2010; Kandiyoti, 2007; Leon *et al.*, 2009; Maon *et al.*, 2009). In a well-developed economy, some basic supplies can be

purchased from local suppliers, and staff can be hired locally for logistical activities. In a less developed context, all supplies have to be imported and most tasks must be managed by expatriate staff (Kunz and Reiner, 2012). Humanitarian logistics are faced with several challenges. Thomas & Kopczak, 2005, presented challenges afflicting humanitarian logistics that are common and applicable to most countries in the world; lack of recognition of the importance of logistics, lack of professional staff, inadequate use of technology, lack of institutional learning and limited collaboration among the humanitarian organizations themselves and with other stakeholders.

2.2.1.6. Institutional Donors

The provision of humanitarian aid and all the activities associated with it need funding. Donors therefore play a key role in providing the funds, or gifts in-kind (goods or services donated free of charge). They give money to meet the ongoing running costs of the organizations involved in providing aid. They also give money and gifts in-kind needed to provide development aid or to respond to a disaster situation. Donors may provide funds for specific use or may leave it to the aid organization to decide how to use the funds. Donors may also provide specific goods or services (Fritz Institute 2012).

In his work, Cozzolino (2012) uses Van Wassenhove's (2006) definition of donors as they provide the bulk of funding for major relief activities. Generally, donations consist of giving financial means (in-cash donations) to support humanitarian operations or providing goods and/or services for free (in-kind donations) while performing logistics operations. Since each player within its own specific role can provide in-kind donations, in the humanitarian relationship model the term "donor" refers to those who exclusively give financial means to fund aid operations. Thus, in addition to country-specific funding provided by governments in recent years, foundations, individual donors, and companies have become important sources of funds for aid agencies.

International humanitarian organizations aim to mitigate human suffering through relief operation, often combining development programs with disaster response. These organizations do not follow standard market principles and their field operations are usually established in volatile and unstable regions within an atypical context, facing many challenges (Van

Wassenhove 2006). They are non-profit oriented, actually reporting to three groups: donors (governments, private foundations, individuals and firms) who finance the operations and are the main funding source, beneficiaries representing demand, and the international community.

2.2.1.7. Socio-political Factors

Every year, around 500 disasters hit worldwide, causing about 75,000 deaths and 200 million affected victims (Van Wassenhove, 2006). Often, such catastrophic disasters affect the local communities' ability to respond, requiring external assistance by relief organizations (Holguín-Veras *et al.*, 2012). Such assistance is however not always welcomed by governments of affected countries, which may refuse humanitarian aid, or ban relief workers to enter the country (Balcik *et al.*, 2010).

Governments play an important role in relief supply chains. They may coordinate activities of relief organizations (Balcik *et al.*, 2010, Tomasini and Van Wassenhove, 2003), support the relief effort through the military (Kovács and Spens, 2007), or regulate NGOs in order to increase their professionalism (Abbey, 2008). But governments can also restrict activities of relief organizations, and thus impede relief supply chains through different means. Some governments use famine as a weapon against their population, and therefore try to control the distribution of food (Murray, 2005). Driven by fears of foreign influence, some governments prevent relief organizations from accessing the affected areas (Long and Wood, 1995; Seekins, 2009).

In other countries, restrictions are imposed through tariff and non-tariff barriers restraining imports of relief supplies. Such import barriers strongly affect the effectiveness and efficiency of relief supply chains, either by limiting the organizations' ability to prepare for disasters in a country (Kovács and Spens, 2009), by creating delivery delays (Van Wassenhove, 2006) or even by preventing relief supplies from being delivered (Long and Wood, 1995).

Some restrictions on relief supply chains are more difficult to identify, as they are not based on a specific regulation but are rather a consequence of extremely bureaucratic procedures. For example, relief organizations usually benefit from duty-free import but must however register their vehicle through a bureaucratic procedure which may take between 3 and 6 months

(Pedraza-Martinez and Van Wassenhove, 2013). Such extreme bureaucracy has in the end a similar effect as non-tariff import barriers.

Similarly, there are situations in which governments do not purposely try to restrict activities of relief organizations, but are simply not willing to facilitate the humanitarian work by adapting their regulations (Akhtar *et al.*, 2012). For example, Chang *et al.* (2010) found that market regulation imposed by governments on supplies needed for reconstruction activities create disincentives for companies to engage in such tasks.

Balcik *et al.* (2010) noted that dysfunctional governments do not play their coordinating role during disasters, which leads to an unclear definition of the roles of the different relief organizations.

Different countries, or regions within countries, will have their own cultures, their own values and their own languages. These need to be understood and be recognized when providing humanitarian aid. It is therefore, important to establish clear and transparent relationships with local authorities. The provision of aid, particularly for an emergency relief operation, requires aid organizations to send large numbers of people to the country affected. This will mean a lot of different people from different cultures, with different languages, coming together and working together (Fritz Institute, 2012).

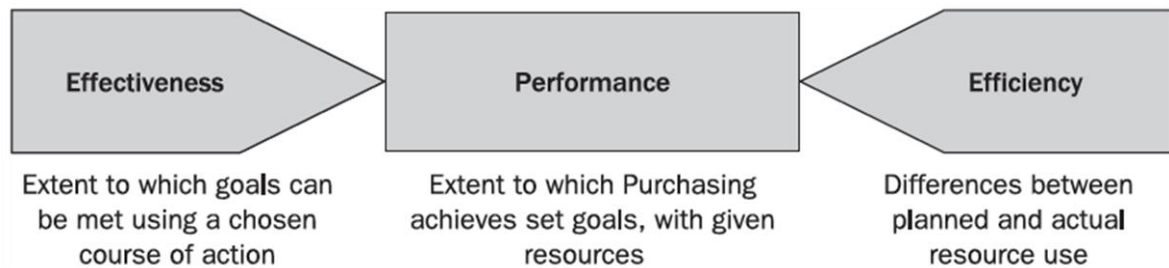
In his attempt to answer a question “Can the company avoid anticipated supply bottlenecks and interruptions?” Kraljic, (1983) asserted by exemplary organization that an automotive parts maker analyzed its sintered metal components supply market, from which it had been sourcing for years, it discovered that political instability was jeopardizing its supply. The company's top management promptly ordered a change in purchasing policy to build up alternative domestic sources (Peter Kraljic, 2009).

The presence of intermittent political instability in different regions of Ethiopia have been a reason to some international non-governmental organizations to do not ship their consignments and other supply chain supports to regional field offices and refugee camps, which are final destinations and place where many beneficiaries are waiting for these materials (US Embassy Ethiopia Security Alert).

2.2.2. Defining Efficient Supply Chain Function

According to Cousins, Lamming, Lawson & Squire (2008) traditionally, purchasing performance concentrated on achieving price savings in the supply market, and other efficiency-based measures. These, however, do not reflect the full extent of purchasing activities, and the preoccupation with such measures may actually detract from the more useful indications of how Purchasing performs across this range of activities. Van Weele (1984) argues that there are two dimensions to performance in any activity, efficiency and effectiveness. *Efficiency* is the relationship between the planned and actual sacrifices which are made to achieve agreed goals – it is, in effect, an operating ratio of effort against results. This may depend on organizational factors such as the workload, certain procedures, the information system used, and headcount, often focusing on transactions. Effectiveness, meanwhile, is the extent to which a goal can be met, using a chosen course of action. Supplier development, value analysis, forward buying programmes and lead-time reduction all impact on assessments of purchasing's effectiveness.

Figure 2.2: The two categories of performance measurement



Source: Paul Cousins, Richard Lamming, Benn Lawson and Brian Squire (2008)

The most effective performance measurement systems will assess performance across the entire length of the firm's supply chain, from suppliers through internal processes to customers.

Effectiveness is defined by Mentzer (1991) as the extent to which goals are accomplished. Efficiency is the measure of how well the resources expended are utilized according to (Beamon 1999). Efficiency in this thesis will be used as describing how well a company optimizes the supply chain to alleviate suffering and create developmental impacts on communities. When

having an excellent supply chain the company can provide products to its customers that are of high quality (De Meyer *et al*, 1989), at low cost (Goonatilake, 1990), within short lead-times (Haug, 1985) and give the requested customer support, (Hoover *et al.*, 2001).

Many companies are discovering that efficient supply chain management is what they need to focus on in order to increase profit and market share. There are companies that have reduced their manufacturing cost as much as is practically possible and then the key issues is SCM. The company has to focus on the whole Supply chain to find new areas where cost can be reduced. Chandra and Kumar (2000) mentioned that many firms have moved aggressively to improve SCM to balance customers demand with the need for profitable growth. Hoover *et al.* (2001) claimed that a difficult part of SCM is to offer better value to the customer and at the same time reduce costs.

According to Christopher (1998), will the future market leaders be the ones that have sought and achieved the twin peaks of excellence. They should have gained both cost leader ship and service leader ship. The purpose of supply chain management is to support the company to earn as much money as possible. This means as low cost as possible and at the same time sell as much as possible. Low cost means that the supply chain cost shall be as low as possible. To achieve a low supply chain Cost the company needs to have best possible internal and external performance. Internal performance can be for example yield, production lead-time. External performance is affecting the customers. Examples of parameters for external performance are delivery precision, lead-time, customer service and price. To achieve market leadership in the world of networks competitors have to focus on network management as well as upon internal processes according to Christopher (1998). To remain competitive in the new global environment companies will have to seek ways to lower cost and service enhanced in accordance with Christopher (1998). This means that Supply chain efficiency and effectiveness will become even more critical.

According to Fritz Institute (2012), in humanitarian organizations the terms supply chain and logistics are both used to describe the process of getting aid, in the form of goods, to the beneficiaries requiring the goods. The term logistics is also used in some organizations to describe the function/department that is responsible for managing the process.

Humanitarian logistics, which plays a key role in every stage of disaster relief operations, is defined as “the process of planning, implementing and controlling the efficient, cost-effective

flow and storage of goods and materials, as well as related information, from point of origin to point of consumption for the purpose of meeting the end beneficiary's requirements" (Thomas and Mizushima 2005).

Supply chain is concerned with the formulation of long-term purchasing policies, supplier base, partnership sourcing, reciprocal and intra-company trading, globalization and countertrade, the purchase of capital equipment and ethical issues. Sourcing costs represent 40 to 80 percent of the cost of goods sold, and 30 to 50 percent of revenues – a ratio that has remained constant in most industries for many years. Companies excelling in strategic sourcing save almost 10 to 20 times as much as it costs to operate their sourcing operations. The effort required to reduce 10 percent of the sourcing cost is much less than gaining similar amount of revenue (Chopra and Meindl, 2003).

Collin, (2003) claimed that it can be concluded that the success of Supply chains are composed of three different dimensions: customer service, capital employed and total cost. Customer service and cost are opposite poles, which have to be balanced to get the best result for a company. Cutting cost in the Supply chain can result in for example a longer lead-time due to that the company cannot have buffer stock. Improvements of lead-time can be done by putting up a buffer stock, but this cost money both in tied-up capital and in risk of scrapping. It is very important for a company to find the balance between supply chain cost and performance towards the customers. There is no general balance that can be used for all companies and all products. Each company have to find their own balance to alleviate suffering and for impacts of developmental activities.

Christopher, (1998) claimed that in examinations of the efficiency of supply chains it is often found that many of the activities that take place add more cost than value. The consideration of both cost and level of customer service is essential when setting up a supply strategy. Bowersox (1996) stated that it is necessary to evaluate the relationship between customer services levels and associated cost when finalizing a logistical strategy. The total cost concept is one of the central fundamentals of today's supply chain management. If the consumer is excluded any generated theory of supply chain management will not reflect the real world since the consumer is the crucial key for the outcome of successful supply chain management.

What is then customer service in the supply chain perspective? Customer service is all activities and performance that adds value for the customer. Low price, short lead-time and accurate delivery dates are three important areas that are important for a customer.

According to Collin (2003) internal states and processes of organizations need to be contingent upon environmental characteristics for a Supply chain to be efficient. There is not a single supply chain that suits all customers. Customer's environmental requirements should determine the appropriate structure for a supply chain. It is not enough for a company to have competitive products and the right supply chain for the average customer.

Fugate, Mentzer, and Stank, (2010) analyzed the relationship between logistics performance and organizational performance, stating that logistics performance is multidimensional and is a function of the resources used in logistics, according to outlined objectives and outcomes against competitors. In this context, the authors theorized that analysis of logistics performance should be based on evaluation of a set of dimensions of the activities carried out by the logistic function, which are namely, efficiency, effectiveness and differentiation. To reduce cost and improve service levels, efficient supply chain strategies must take in to account the interactions at the various levels in the supply chain according to Simchi and Levi, (2000).

2.2.3. Concept of efficiency measurement in humanitarian SC context

Performance measurement is generally defined as the process of quantifying the efficiency and effectiveness of action, where effectiveness is meant to gauge the extent to which customer's requirements are met, while efficiency measures how economically firm's resources are utilized to achieve a predetermined level of customer satisfaction (Neely, Gregory, and Platts (1995) and Agami, Saleh and Rasmy, (2012). However, firm performance is a multi-dimensional concept that involves many aspects in its measurement. Akyuz and Erkan (2010) argued that despite the large number of works done on performance measurement, the existing literature lacks a unified definition of what is included and excluded. However, it has been also asserted that performance concept includes both financial and non-financial (operational) aspects and related measures wherein the financial aspect supposed to include sales, profitability and return on investment as pertinent measures among others, whereas the non-financial aspect, on the other hand, supposed

to include measures like inventory performance and cycle time to mention few (Martin and Patterson, 2009).

Fritz Institute (2012) asserted that for supply chain performance, it is usual to have metrics that focus on the performance to the customer, i.e. customer service, and metrics that focus internally on the efficiency of the process, particularly the cost of carrying out the process. In addition to the internal and external focus, we must also consider measuring the performance of the supply chain links. Customer Service - when deciding which metrics to use to measure customer service, it is important to first identify who the final customer is and what is important to them. In humanitarian aid situations, the final customers are the people placing demands/requests on the supply chain. Attributes of service that are important to them might be: quality of the service provided, speed that the supply chain can respond, dependability of the supply chain, flexibility of the supply chain. The following are examples of metrics that can be used to measure customer service: delivery performance, supply chain response time/lead time, information on status of orders. Efficiency of the Process - although providing good customer service is clearly the main aim of the supply chain, it is important that this is done efficiently. To purely focus on measuring and managing customer service can lead to inefficiency and unnecessary costs. It is therefore, important to measure cost. The below is the metric that can be used to measure the cost of the supply chain: total supply chain costs - these are the sum of all the supply chain costs including people, inventory carrying, goods acquisition and order management costs (Fritz Institute, 2012).

Particular to supply chain management, Thakkar, Kanda, and Deshmukh (2009) suggested that since it is affected by, and in turn affects, many aspects of the firm's operations, and environment, the supply chain performance measurement is a difficult proposition. In a similar fashion, Otto and Kotzab (2003) asserted that performance in a supply chain context and its measurement is dependent on the unique notions and problems, which can be identified beyond the perspectives available to be considered, and hence, none of the available alternatives is an optimal approach for all contexts; instead, from the SCM holistic requirements, different performance metrics should be combined. Thakkar, Kanda, and Deshmukh, (2009) also suggested, in this respect, that performance measurement metrics should have the capability to capture the essence of organizational performance, ensure an appropriate assignment of metrics to the areas where they would be most appropriate, minimize the deviation that exist between the

organizational goals and measurement goals, and measures, and reflect their clear linkages with various levels of decision-making such as strategic, tactical, and operational.

A successful humanitarian disaster operation mitigates the urgent needs of a population reducing vulnerability under time and resources constraints (Van Wassenhove 2006). Unlike logistics managers in the private sector, humanitarians face difficulties due to their operations' nature. In addition, even with accurate data, both demand and supply can vary significantly during the response operation period. Unexpected events also force resources to move out of one operation field and head off to another, even overnight. When a state of emergency is declared and aid is appealed, resources such as relief personnel, relief goods and equipment are mobilized to the disaster location. By its definition, mobilization of resources as well as its predecessor and successor operations in a relief chain (Duran, Gutierrez, and Keskinocak, 2011) can be categorized as humanitarian logistics, which contribute to more than 80 % of the total relief costs (Van Wassenhove 2006). Performance of humanitarian logistics activity is complex (Petit and Beresford, 2009), because humanitarian efforts are often located in areas with political, demographic, geographic, cultural and infrastructural complexity. Performance measurements are becoming more and more important when SCM is coming into focus. Neely (1999), presents 7 drivers for the increasing interest in performance measurements. These are: The changing nature of work. The cost of direct labor related to cost of material has dropped rapidly since the 1950s, increased competition, specific improvements initiatives example just-in-time, total quality management, Business process Reengineering, national and international quality awards, changing organizational roles changing from control to empowering employees by management by objectives, changing external demands. Firms in the public sector must present information about their performance, and the power of information technology. Therefore, it can be difficult to set up the right performance measurements in a company. Some measurements are coming into more focus than others. Consultants companies working with Supply chain related questions are influencing companies with the terms they have chosen to work with. It is difficult to measure the performance in supply chains according to (Schmitz and Platts, 2003). According to Harrison and New (2002) half of the companies they contacted in their research had limited possibilities to do performance measurements in their supply chain. 19 percent couldn't measure at all. Chibba (2007), claimed that large companies often measure the effectiveness by key performance indicators and that these are too broad to fully capture supply chain effectiveness.

Since logistics occupy 80% of disaster relief (Van Wassenhove, 2006), measuring the performance of logistics operations and more precisely supply chain management is significant for humanitarian aid and disaster relief. An effective performance measurement system can help practitioners make relief decisions, and can enhance the efficiency and effectiveness of relief operations. Performance measurement can improve the transparency and accountability of disaster responses (Beamon and Balcik, 2008). However, research has not widely developed and systematically implemented performance measurement systems in humanitarian aid and disaster relief supply chain due to the uniqueness and complexity of the disaster relief environment (Beamon and Balcik, 2008).

Ira Haavisto (2014), in his study of “performance in humanitarian supply chain” argued that research on performance measurement in the humanitarian sector has by now been conducted by de Brito *et al.* (2007), Schulz and Heigh (2007), Beamon and Balcik(2008), and Blecken *et al.*(2009),among others. In all these studies, performance measurements were developed for emergency relief operations, not for longer-term program supply chains. More specifically, Beamon and Balcik (2008) suggested that performance in humanitarian settings be measured as output, resources and flexibility.

A recent exception is the research conducted by Davidson (2006) that proposes a performance measurement framework of relief logistics for the International Federation of Red Cross and Red Crescent Societies. The framework is based on four indicators which measure supply chain performance in terms of the trade-offs of speed, cost and accuracy: appeal coverage, donation-to-delivery time, financial efficiency, and assessment accuracy. Despite the fact that this research is performed with an international non-profit humanitarian organization in mind, the principles of measurement are related to other organizations that take part in disaster relief operations such as non-governmental organizations and governmental agencies.

The dominating characteristics that bring additional complexity and unique challenges to relief chain design and management according to Kovács and Spens (2012) are: unpredictability of demand in terms of; timing, location, type, and size, suddenly-occurring demand in very large amounts and short lead times for a wide variety of supplies, high stakes associated with adequate and timely delivery, lack of resources (supply, people, technology, transportation capacity, and money), uncertainty, communications, degraded infrastructure, human resources, earmarking of

funds. Lysons *et al* (2006) states that global sourcing efficiency is affected by: government red-tape, fluctuations in government exchange rates and unqualified foreign sources.

2.3. Empirical Review of Literature

Fugate, Mentzer, and Stank, (2010) analyzed the relationship between logistics performance and organizational performance, stating that logistics performance is multidimensional and is a function of the resources used in logistics, according to outlined objectives and outcomes against competitors. In this context, the authors theorized that analysis of logistics performance should be based on evaluation of a set of dimensions of the activities carried out by the logistic function, which are namely, efficiency, effectiveness and differentiation.

2.3.1. Information Technology and Supply Chain Efficiency

Mwanjumwa and Fridah (2015) claimed that there is significant evidence showing that application of information technology has an influence in supply chain efficiency. Furthermore, their study depicted that no other supply chain factor was found to be strongly correlated like information technology does among the variables under study.

Cliffe (1999) quoted that 65% of executives believe that ERP systems have at least a moderate chance of hurting their businesses because of the potential for implementation problems, which may disrupt the day-to-day operations. Davenport (1998) argued that ERP system is difficult to implement and expensive. He also argued that most ERP system projects fail during the implementation stage. Umble and Umble (2002) discussed ten factors that may lead to implementation failure. In the survey that they quoted, 77% of respondents believe that poor planning and management are major contributors for the implementation failure. It then follows by change of business goals during the project (75%) and lack of business management support (73%). Umble *et al.* (2003) presented empirical findings on the implementation and critical success factors of ERP projects.

Barker and Frolick (2003) examined the failure of ERP implementation at a soft drink bottler company. They argued that this company undermined the importance of involving, supervising, recognizing, and retaining those who work or will work with the system. O'Leary (2002) offered

a discussion on when is it appropriate to use heterogeneous expert opinion as a basis for research on ERP systems.

In their case studies of organizations by giving fictitious names for real companies, Patrick, Hui, Kidith, Choi, and Liu asserted that a multi product group, Company A, which designs and sells products such as apparels, leather products, watches, foot wears, etc failed to implement ERP. In 2006, with a goal of optimizing the company's supply chain performance (sourcing capabilities, lead-time reduction) and supporting the company's growth in retail business, Company A conducted a large-scale business processing re-engineering and invested substantially in an ERP solution. The company appointed a new information systems director for this project, who aimed to implement an ERP system that can be used and shared by all product categories. A high degree of integration with suppliers was also desirable (eds. Cheng and Choi, 2010).

However, upon the implementation and changes, the attempt was deemed as a failure because the supply chain costs were over 50% higher than before, with only a very marginal single-digit increase of revenue recorded. Other problems such as a lack of data transparency and poor migration of data were reported. Finally, the major reasons that accounted for the failure of Company A's ERP system implementation project included the following: a lack of coordination for the project (the project leader and other related parties did not work closely together and most staff members did not get involved at all), top management lacked vision and offered limited support (the top management even failed to tell the staff members the importance of the project), over-ambitious in having all product lines integrated together, failure to provide the right incentives to involve people in multiple disciplines to work together, failure to define roles of participants and goals to achieve.

As a multinational textile group, Textile Plc. (TP) was studied by Holland and Light (1999) on its strategic context and implementation of its global ERP project in one of its international textile firms, Threads. Prior to ERP implementation, the workflow study reflected a fragmented use of over 40 legacy systems which led to the existence of compliance problems. Upon adoption of the global ERP system, TP could focus on its strategic vision and well approach its target markets as customer services were standardized. The ERP system operated in parallel with the original systems in TP. For the resulted benefits, apart from being able to focus on strategic

visions, the ERP system allowed TP to reduce overhead costs and gain better control by top management. However, to fully adopt the system, TP had spent six years for the entire re-engineering process, of which a total of three years were contributed to tracing and analyzing the ERP project scopes. Although the benefits brought by the ERP system in TP were tremendous, it incurred the company substantially in staff training with numerous workshops, as well as the costs of configuration.

The other case P.C.L. Hui *et al.* studied was Company Y, who has her own textile and garment business and participates in the global trade. To facilitate tracking of customer information, the company adopts a module of an ERP system in the finance and accounting department with a secured online system that allows accessing to such information at anytime, from anywhere.

This module is also used for cost control and cash flow management. The ERP accounting and finance module adopted by this company has assisted finance managers on accessing information and making decisions easily. However, the company installed the ERP system in only one department. The finance team is required to consolidate the data from different systems to generate reports using the ERP module.

As different departments in the company use different systems, all of which do not integrate with one another or with a single, unified database, overall performance of the company has not been improved substantially, not to mention efficiency of the entire supply chain. The ERP in use has not yet been executed in the supply chain division. It is noticed that the company requires an integrated system in order to enhance efficiency and gain flexibility in business processes. Therefore, it needs a full implementation of the ERP instead of partial adoption of a few modules.

2.3.2. Organizational Policies and Supply Chain Efficiency

Grace and Fridah (2015) asserted in their studies that procurement policies in humanitarian organizations should be streamlined by the policy makers in such organizations to ensure that they do not inhibit delivery of critical services. Furthermore, their study claimed that humanitarian organizations should invest in information technology. This will ensure that the procurement processes are made more efficient towards aiding service delivery. In their empirical study conducted in International Committee of the Red Cross in Kenya Mwanjuma

and Fridah (2015) have concluded that procurement policies are highly correlated with supply chain efficiency.

2.3.3. Training and Development and Supply Chain Efficiency

Mwirigi (2013) claimed on his case study at United Nations Children's Fund (UNICEF) in Kenya that humanitarian organizations must develop dynamic training modules to periodically induct its supplies staff on global environment and trends. In the same manner he insists humanitarian organizations to clearly document the competences required to successfully engage in global sourcing and gain the necessary value-addition and effective level out of the process.

Training and development is a key challenge for procurement organizations. That include: skill development; the right recruiting and retention practices; and career paths in other functions outside of procurement (Gocke, 2008).

In his study of the “effect of reward on motivation of the IRC Ethiopia employees” Haimanot (2017) argued that IRC has identified different factors which are affecting its rewards composition. The major ones are little interest of donors to invest much on administrative costs (they focus on programmatic/direct costs), increased competition from other financially strong private as well as International Non-Governmental Organizations (INGOs), Charities and Societies Proclamation (621/2009) of Ethiopia which regulates 70/30 allocation of expenses for direct implementation of its purpose and for administrative activities, and others.

2.3.4. Lead Time and Supply Chain Efficiency

According to the research done in Korea, all flexibility related variables, namely ability to adjust order quantities and order specifications, distribution system flexibility, and ability to react to market fluctuation were considered relatively high in importance but low in satisfaction. Evaluating factors affecting logistics customer service performance for car manufacturing companies in Korea through the structural equation model, found the relationships between customer service factor across the other factors (flexibility, IT system, inventory, and responsiveness factors) and relationships among the others (Sang & Taehun, 2006).

Many firms have been observed to evaluate performance, primarily on the basis of cost and efficiency (Skinner, 1971). Besides the financial measures, we now have the non-financial measures which include time, quality and flexibility. Time element has strategic importance in business and hence time has to be used as a strategic metric in performance measurement (Stack *et al*, 1990) (Ira Haavisto, (2014).

2.3.5. Socio-economic Factor and Supply Chain Efficiency

Socio-economic situational factors, such as the type of market economy, the presence of local suppliers, the level of education of the population, the local culture and religion will oblige relief organizations to adapt their operation to the context, and can affect the performance of humanitarian logistics (Altay *et al.*, 2009; Dowty and Wallace, 2010; Kandiyoti, 2007; Leon *et al.*, 2009; Maon *et al.*, 2009). In a well-developed economy, some basic supplies can be purchased from local suppliers, and staff can be hired locally for logistical activities. In a less developed context, all supplies have to be imported and most tasks must be managed by expatriate staff (Kunz and Reiner 2012). Humanitarian logistics are faced with several challenges. Thomas & Kopczak, 2005, presented challenges afflicting Humanitarian Logistics that are common and applicable to most countries in the world; lack of recognition of the importance of logistics, lack of professional staff, inadequate use of technology, lack of institutional learning and limited collaboration among the humanitarian organizations themselves and with other stakeholders

2.3.6. Socio-political Factor and Supply Chain Efficiency

Nathan and Gerald conducted case study, which identified 44 occurrences of governmental restrictions experienced by the case study organizations in 18 countries.

According to the case study result the pointed out types and examples of governmental restrictions imposed on relief supply chains include: Import barriers: Tariffs, Delays at customs clearance, Extreme complexity of clearance procedures, Rules of origin, Ban of import on medicines and satellite communication equipment,

- Access barriers: Restriction of access of staff (visa) or organization,
- Control of activities: Extreme governmental control of NGO activities and movement,

- Corruption: Bribery requested for customs clearance of relief items, Imaginary taxes created,
- Bureaucracy: Numerous authorizations needed Complex administrative procedures (car registration, labor law, etc.).

2.3.7. Institutional Donors and Supply Chain Efficiency

Another major problem faced by logistics managers in humanitarian organizations is that the donor has significant influence over where and how aid is distributed while the victim is a third party with little voice in the matter (Long and Wood, 1995:225). Funding for organizational support and infrastructure is often neglected under donor demands that as much aid as possible is pushed to victims. Thus, distribution channels may suffer as warehouses, equipment, communications infrastructure, and training remain unimproved or deteriorating. Thomas writes:

According to Thomas, (2003) donor scrutiny over the usage of funds, concern that contributions flow directly through to beneficiaries combined with earmarking of donations for particular relief operations, drives HROs (humanitarian relief organizations) to focus on direct relief rather than investing in systems and processes that will reduce expenses or make relief more effective over the long-term. Thus, operational disaster response approaches are encouraged by the funding mechanism and strategic disaster preparedness opportunities are discouraged. This results in an underinvestment in infrastructure such as information systems and warehousing facilities, and a reluctance to preposition inventory to improve responsiveness.

As a result, there may be aid available, but the organization may be incapable of effective delivery in a timely manner due to limiting factors in the distribution process.

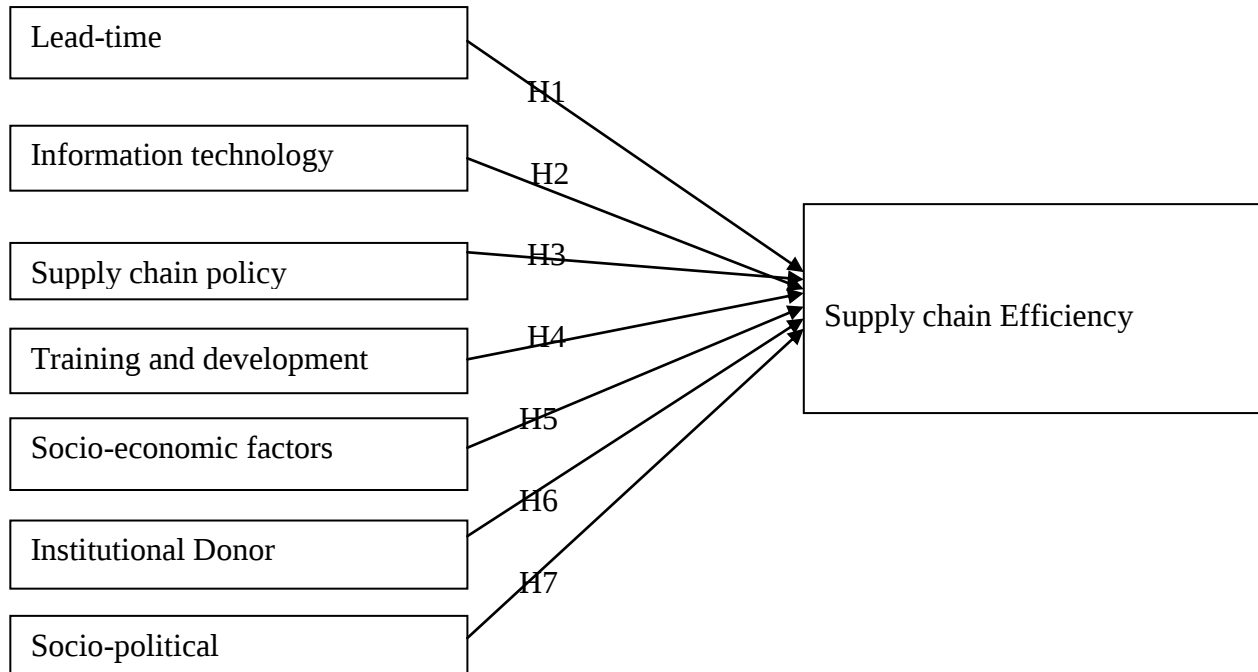
Organizations may, for example, be “reluctant to spend money on a sophisticated information system that would actually improve their efficiency in the long run” (Long, 1997:29). Earmarking funds specifically for the affected population can also lead to a lack of parts and service support for the truck and planes required to move material aid (Long and Wood, 1995:226) and lack of funding for unallocable costs such as headquarters expenses (Randel and German, 2002:22).

2.4. Conceptual Framework

Based on the discussion of literatures, the research framework is shown in the below figure.

Figure 2.3: The study framework

Independent variables: Supply Chain Factors Dependent variable: Supply Chain Efficiency.



Based on the above literature review and conceptual framework, the following summarized hypotheses are made to achieve the objectives of the study.

H1. Lead-time has statistically significant impact on supply chain performance efficiency of IRC Ethiopia country program;

H2. Information technology has statistically significant impact on supply chain performance efficiency of IRC Ethiopia country program;

H3. Supply chain policy has statistically significant impact on supply chain performance efficiency of IRC;

H4. Training and development has statistically significant impact on supply chain performance efficiency of IRC;

H5. Socio-economic factors have statistically significant impact on supply chain performance efficiency of IRC;

H6. Institutional Donors have statistically significant impact on supply chain performance efficiency of IRC;

H7. Socio-political factors have statistically significant impact on supply chain performance efficiency of IRC.

CHAPTER THREE

3. RESEARCH METHODOLOGY

The purpose of this chapter is to describe the research methodology and techniques that was used to conduct the study. In this chapter the practical methods used in order to answer the research questions and fulfill the purpose of the research are presented. That means it provides an overview of the research study area, the research approach, design and method, population and sample, data source and type, data collection instrument, data collection procedure, ethical considerations, and finally the methods of data analysis. Besides, to use the advantages of both qualitative and quantitative research approaches (to better generalize, triangulate and explain findings) a mixed approach is used.

3.1. Description of the study area

The study has created a detailed awareness and understanding on the relationship that exists between supply chain efficiency (dependent variable) and supply chain factors (independent variable), in the IRC Ethiopia Program. IRC Ethiopia is currently working in Tigray, Somali, SNNPR, Oromia, Benshangul Gumuz, and Gambella regions. The head office is found in Addis Ababa. The study has covered all the operation areas in Ethiopia.

3.2. Research Approach

To realize the target and provide a conclusive answer for the research questions outlined in chapter one and to test the hypothesis, the study employed a mixed approach, by which both qualitative and quantitative methods were used. The reason behind is to better understand the reality in both objective and subjective dimensions and to benefit from the different advantages of the two methods like; better explaining and generalizing. Though, it used mixed approach, most of the data were gathered using quantitative approach and the qualitative approach was used to cover subjective issues, to better explain realities, and to triangulate findings of the quantitative data. Hence, it was sequential explanatory design to help examine, explain, and contextualize quantitative findings.

3.3. Research Design

Research design is a blueprint for empirical research aimed at answering specific research questions or testing specific hypotheses through specifying the methods and procedures for collecting and analyzing the needed information (Bhattacharjee, 2012). Quantitative study approach was conducted in order to show factors affecting humanitarian supply chain on supply chain function efficiency. According to Burns and Gorge (1993), quantitative approach helps researchers to test relationships between variables. Besides, it also helps in examining and describing a cause and effect interactions among those variables. Descriptive and explanatory research designs were also used. The Descriptive research design was used to understand and systematically describe the factors affecting supply chain and supply chain efficiency. According to Mugenda (2003) a descriptive research is a process of collecting data in order to answer questions concerning the current status of the subjects in the study. The purpose of a descriptive research is to determine and report the way things are done. Descriptive research was used to obtain information concerning the current status of the phenomena to describe what exists with respect to variables or conditions in a situation. The methods involved a range of activities: from the survey which describes the status quo to the regression study which investigates the relationship between variables. The primary use of descriptive statistics is to describe information or data through the use of numbers (create number of pictures of the information). The explanatory research designs are concerned with determining the impact and cause and effect relationships among variables. Therefore, this research employed descriptive and explanatory research approaches in order to give an adequate depiction of the association between the factors affecting humanitarian supply chain and supply chain function efficiency.

3.4. Population and Sample

The population is all individuals of interest to the researcher (Geoffrey, David & David, 2005). As per the actual data obtained from the International Rescue Committee, Ethiopia Country Office, currently the organization has eight field offices in different regions of the country, focusing on refugee and local community development projects and its head office in Addis Ababa. Accordingly, the study included all regional offices: Melkadida and Jijiga field offices in Somali Region; Shire field office in Tigray Region; Assosa field office in Benishangul-Gumuz

Region; Hawassa field office in SNNP Region; Gambella field office in Gambella Region; Adama in Oromia Region and the head office in the capital - Addis Ababa. The organization has a total of 851 national staffs hired on full time contractual agreement.

Table 3.1 Number of employees in the IRC - Ethiopia Program

Name of Field Offices and number of staffs hired for indefinite period									
Addis ababa	Jijiga	Melkadida	Shire	Hawassa	Assosa	Gambella	Amhara	Adama	Tot.
113	123	134	135	92	126	93	2	33	851

Source: IRC staff number update report December 2017

The members of the target population were 94 supply chain staffs working in Addis Ababa and all field offices. The population to be targeted for this study hence consisted of 94 national supply chain respondents working in Addis Ababa and field offices. All employees of supply chain department above grade three were taken to constitute as the study population. Due to the small number of the target population in eight field offices, the researcher has decided to consider the entire population in the study, i.e. to conduct census survey, rather than sampling from the population. This is on the basis of the suggestion that if the target population is smaller (e.g. 200 or less) census survey is very appropriate and effective since virtually all population would have to be sampled in small populations to achieve a desirable level of precision (Israel, 2013).

Table 3.2. The target population with field offices and position

Title	Addis Ababa	Jijiga	Shire	Hawassa	Assosa	Gambella	Melkedida	Adama	Tot
Assistant officer	2	1	2	2	1	0	1	1	10
Officer	3	11	7	8	7	10	11	7	64
Manager	7	1	2	1	2	1	1	1	16
Coordinator and assistant coordinators	3	0	0	0	1	0	0	0	4
Sub total	15	13	11	11	11	11	13	9	94

Source: Staffing report of the IRC Ethiopia, Dec. 2017

3.5. Data Source and Types

The study used both primary and secondary sources of data. Primary sources was extracted in order to realize its objective and to describe the relationship between the independent and dependent variables and to see employee's perception, the study collected most of the data using survey questionnaire. The data was collected from employees of the IRC Ethiopia program. Semi structured and unstructured interview with supply chain coordinator and IT and system administration manager was also conducted. Secondary data was collected from supply chain manual of the organization, reports, books, and published and unpublished documents to make the study comprehensive. To support the findings from the questionnaire, review of related literature was conducted to compare the alignment of the research findings with previous studies and enrich the findings.

3.6. Data Collection Procedures

Information used in the study was collected through questionnaire and interview. The questionnaire prepared to be self-explanatory, and it allowed categorizing factors of humanitarian supply chain efficiency and was expected to answer the research questions, based on different literatures on supply chain functions. It has three major parts (in addition to the one

which introduces the purpose, ethical considerations, and over all guide). The first part was about the respondents' background information like gender, age, education, experiences in IRC, job grade, and duty station. The second part contained a 5-point "Likert" scale with 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree questions related to supply chain factors and efficiency intended to understand perception or efficiency of supply chain function and factors affecting this efficiency in IRC Ethiopia. The third part contains one open-ended question to get opinion and suggestions of respondents to improve the supply chain function efficiency. The questions related to supply chain efficiency was classified in to eight broad categories based on their similarity. They are categorized as lead-time of orders placed on suppliers, information and communication technology, supply chain policy, training and development, socio-economic factors, institutional donors, and socio-political factors and supply chain efficiency.

As the organization uses Microsoft Outlook as a means of formal electronic communication and as all grade 3 and above staffs have an account and access for organizational domain, the questionnaires was distributed to all participants in the outlets of Addis Ababa through Microsoft Outlook and through hardcopy to supply chain staffs working in Addis Ababa. The data collection in the head office was conducted by the researcher and for the field offices; focal persons from supply chain department was assigned. When further clarifications are required on the questionnaire, face-to-face through Skype and telephone briefings was conducted.

The interview with the country supply chain head was contained with a mix of semi structured and unstructured question which are helped in triangulating findings of the questionnaire. A tape recorder was also used to save the information. The study involved two data collection stages: pilot survey and formal survey. The pilot survey is designed to test the viability of the study and purity of the data collection instruments. Three humanitarian logistics executives critiqued the research instrument for relevance and clarity. The questionnaire for the main study was refined based on the feedbacks the experts gave.

3.7. Reliability and Validity

Reliability is the degree of internal consistency with which an instrument measures the constructs it is designed to measure. Reliability is known as to what extent the research findings

can be replicated, if another study is undertaken using the same research methods (Ritchie and Lewis, 2003). This means the measure (data collection tools) should provide the same answer on another occasion or similar result should be obtained by another researcher using the same measuring instrument (Saunders *et.al.* 2007). There are four treats for reliability including participant error, participant bias (may not tell the truth for fear of top managements), interviewer error (when different people undertake the interview), and researcher's bias during interpretation (Robson, 2002).

According to Kothari (2004), the respondents, the situations, the interviewer, and the data collection instrument can be sources of error in research. Validity is concerned with two main issues: whether the instruments used for measurement are accurate and whether they are actually measuring what they want to measure. The two different dimensions to the concept of validity (Winter, 2000) also are: internal and external validity. Internal validity ensures that the researcher investigates what s/he claims to be investigating. Internal validity is the extent to which the measurements of the questionnaire provides the data needed to meet the purpose of the study or it refers to the extent to which the questionnaire measures what the researcher intends to measure to ensure internal validity. External validity concerned with the extent to which the research findings can be generalised to wider population.

The validation process for the survey instrument was composed of three steps: content validity, construct validity, and reliability. The related literature reviewed and in-depth interviews with humanitarian logistics executives have established the basis of content validity for the survey instrument.

To ensure quality of data, feedbacks on the questionnaire were gained from the research advisor and humanitarian supply chain professionals; and then pilot test was conducted. Besides to these, to check the reliability of data, Cronbach alpha reliability test was done.

According to George and Mallery (2003), Cronbach's alpha reliability coefficient normally ranges between 0 and 1. The closer Cronbach's alpha coefficient to 1.0 the greater the internal consistency (reliability) of the items in the scale. George and Mallery (2003) suggested that Cronbach's alpha coefficient greater than 0.7 is acceptable. The reliability of this instrument was determined with the aid of the SPSS-program in conjunction with Cronbach alpha coefficient.

3.8. Data Analysis

Data obtained through questionnaire was cleaned, categorized, analyzed and then presented using both descriptive and inferential statistical methods. ‘Descriptive statistics allowed the researcher to describe the data and examine relationships between variables, while inferential statistics will allow the researcher to examine causal relationships’. (Geoffrey, David, and David, 2005: 209).

The data gathered from questionnaires were examined and validated by checking the answers and numbering them. Descriptive statistics including percentage analysis, mean, standard deviation, tables and graphs, was used to describe and summarize responses.

Inferential statistics was used to draw conclusions about the reliability and generalizability of the findings. Accordingly, Pearson Product-Moment Correlation Coefficient was used to understand the relationship between the dependent and independent variables; Multiple Linear Regression Analysis to understand the significance and effect of each factors of humanitarian supply chain on the supply chain efficiency as well as to know the overall contribution of those humanitarian supply chain factors on humanitarian supply chain efficiency; and Analysis of Variance (ANOVA) was used to clearly spot the difference on factors affecting and efficiency. To process data, Statistical Package for Social Science (SPSS) version 23 was used.

Data obtained from key informant interview was recorded and then transcribed, summarized, interpreted, and triangulated to get an over rounded understanding on the study’s subject matter and to better generalize findings of qualitative data.

3.9. Ethical Consideration

In order to build honesty in the mind of respondents it was necessary to give full information about the purpose of the study and the researcher's status and role. Such action has helped the respondents to avoid deception and not to cause harm of any body by any action of the study. Giving respect for participants’ right not to take part in the study and disclosing of the need for confidentiality of their response and use of data to be believed to increase the credibility. Maintaining the objectivity of the study in the process of data collection, analysis of the collected data and report preparation stages have helped to enforce researcher to keep the balance and

avoid bias. The researcher did not disclose any personal information of the respondents and that was explained during the distribution of the questionnaire and, for the interviewee before conducting the interview. In addition, credit was given to the authors of documents referred. The International Rescue Committee's senior management team will also be provided with a copy, prior to the publication of the research document

CHAPTER FOUR

4. DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.1. Introduction

This part is dedicated to the analysis of the study data, presentation and discussion of the research. Accordingly, for the interest of keeping logical flow of the presentation, subsequent to instrument reliability test the demographic information of respondents is highlighted, followed by the presentation of descriptive statistics, correlation analysis and regression analysis in that order. Out of the total of 94 questionnaires that were distributed to all supply chain employees, 78 (82%) properly filled questionnaires were collected and used for the analysis. The data collected from the target population was analyzed using SPSS version 23.

4.2. Reliability Test

Internal consistency of the items constituting the dimensions of the independent and dependent variables was checked by using Cronbach's alpha. Accordingly, the reliability of the study instrument has been determined by evaluating the average correlation among items in the scales of the respective dimensions representing the independent and dependent variables as suggested by Chen et al. (2004). The resulting Cronbach's alpha values of the dimensions are presented in the following table.

Table 4.1. Reliability of Questionnaire Dimensions

Category	Cronbach's Alpha (α)	No. of Items
Longer lead-time	0.876	5
Information technology	0.715	6
Supply chain policy and SOPs	0.888	4
Training and development	0.878	6
Socio-economic factors	0.729	8
Institutional donors	0.894	4
Socio-political factors	0.792	6
Supply chain efficiency	0.786	6

Source: Survey result, 2018 respondents' opinion analyzed using SPSS version 23

Looking at a glance at the above table implies that all alpha values for the respective dimensions were well above the suggested cut-off value of 0.7 (Cronbach, 1951), hence implying the reliability of the instrument that measures the study constructs, i.e. the items under the respective scales could properly measure the dimension/variables of concern. The lowest alpha value was 0.715 and it was in the case of logistics integration, whereas the highest was for long-term relationship with the alpha value of 0.894.

4.3. Respondents' Demographic Information

As implied in the preceding part of this study, the entire supply chain population of International Rescue Committee in Ethiopia was considered in the study. The coordinators at the central supply chain departments of the organization purposively selected and were chosen as the appropriate respondents to the study, hence making the total number of respondents 94. However, only 78 respondents have filled and returned the questionnaire, which essentially made the response rate about 82%. The demographic information of the respondents who have filled and returned the questionnaire is presented on the following Table 4.2.

Table 4.2. Respondents' demographic information

		Frequency	Percent	Valid Percent	Cumulative Percent
Gender	Male	65	83.33	83.33	83.33
	Female	13	16.67	16.67	100.00
	Total	78	100.00	100.00	
Age	20-30 years	21	26.92	26.92	26.92
	31-40 years	45	57.69	57.69	84.62
	41-50 years	9	11.54	11.54	96.15
	Above 50 years	3	3.85	3.85	100.00
	Total	78	100.00	100.00	
Education	Diploma	6	7.69	7.69	7.69
	First degree	57	73.08	73.08	80.77
	Master's degree	15	19.23	19.23	100.00
	Total	78	100.00	100.00	
Job positions	Assistant (G3)	10	12.82	12.82	12.82
	Officer (G4)	48	61.54	61.54	74.36
	Manager (5)	16	20.51	20.51	94.87
	Coordinator (G6 and 7)	4	5.13	5.13	100.00
	Total	78	100.00	100.00	
Service years	<= 1 year	8	10.26	10.26	10.26
	>1, <=3 years	3	3.85	3.85	14.10
	>3, <=5 years	22	28.21	28.21	42.31
	>5, <=7 years	26	33.33	33.33	75.64
	>7, <=10 years	11	14.10	14.10	89.74
	>10 years	8	10.26	10.26	100.00
	Total	78	100.00	100.00	
Field offices	Shire	9	8.97	8.97	11.54
	Jijiga	10	12.82	12.82	24.36
	Melkadida	10	12.82	12.82	37.18
	Assosa	9	11.54	11.54	48.72
	Hawassa	9	11.54	11.54	60.26
	Gambella	9	11.54	11.54	71.80
	Adama	7	7.69	8.97	80.77
	Addis Ababa	15	19.23	19.23	100.00
	Total	78	100.00	100.00	

As depicted on the table, males dominate the respondents' list registering about 83.33% of the total respondent with females taking the remaining 16.67% of the respondents. As far as respondents' age is concerned, the majority of the respondents (57.69%) were aged between 31-40 years followed by the age categories of 20-30 years, 41 to 50 and above 50 years respectively with percentage scores of 26.92%, 11.54% and 3.85% in that order.

With regard to educational qualification, significantly higher percentage of the respondents (73.08%) were first degree holders, whereas those having second degree and diploma stand second and third in the ladder of educational qualification accounting for 19.23% and 7.69% of the total number of respondents.

Concerning job position, 12.82% are employees on grade 3, 61.54% on grade 4, 20.51% on grade 5, and the rest 5.13% on grade 6 & 7. Hence, most of the respondents are on G4 (Supply Chain Officers) followed by G5 (Supply Chain Managers).

On the other hand, an essential descriptor of the profile of the respondents - years of service under the relevant job positions was also assessed and it has been revealed that those who have served 5 to 7 years dominate the list by taking 33.33% of the entire respondents. Those who have served 3 to 5 years, on the positions of concern came second on the ladder followed by the category of respondents who have served 7 to 10 years, above 10 years, 1 year and 1 to 3 years respectively with the corresponding percentage scores of 28.21%, 14.10%, 10.26%, 10.26%, and 3.85%.

Besides to the above descriptive, with reference to field offices, 8.97% work in Shire field office, 12.82% in Jijiga Field Office, 12.80% in Melkadida Field Office, 11.50% in Assosa Field Office, 11.54 in Hawassa field office, 11.54% in Gambella field office, 7.69% in Adama and the other 19.23% work in the head office - Addis Ababa. It has been revealed that though the numbers of programs in these different locations vary the supply chain performing staffs are evenly distributed and relatively more supply chain staffs are confined in Addis Ababa to coordinate all supply chain supports across the country.

4.4. Descriptive Analysis

Descriptive statistics was assessed in an effort to examine the mean scores and the corresponding standard deviations under the respective scales of both the dimensions of the independent variable, namely longer lead-time, information communication technology, supply chain policy, training and development for supply chain, socio-economic factors, institutional donors, and socio-political factors and the dependent variable, namely supply chain efficiency of International Rescue Committee (IRC-Ethiopia). Hence, this particular endeavor has the merit of answering some of the research questions on the basis of the perceptions of the respondents on the level of factors affecting humanitarian supply chain in the organization and the corresponding efficiency of supply chain functions.

The resulting composite scores of mean and standard deviation are presented on Table 4.3. as follows.

Table 4.3. Composite scores of mean and standard deviation

Dimensions/Scale	N	Mean	Std. Deviation
Lead Time	78	2.46	.544
Information technology	78	2.65	.643
IRC SC policy	78	2.49	.478
Training & development	78	2.70	.835
Socioeconomic factors	78	2.70	.515
Institutional donors	78	2.88	.549
Socio political factors	78	2.75	.514
SC efficiency of the org	78	2.92	.672
Valid N (listwise)	78		

Source: Survey result, 2018

4.4.1. Respondents' perception on factors affecting supply chain and supply chain efficiency

The mean values of each of the scales of sociopolitical factors, institutional donor factor and supply chain efficiency of the organization were calculated between 2.75, 2.88, and 2.92 with standard deviations 0.514, 0.549 and 0.672 respectively.

The lowest mean values were registered in the case of lead-time of the materials to be supplied, supply chain policy of the organization, information technology of the organization, training and development programs and socioeconomic factors were calculated between 2.46, 2.49, 2.65, 2.70, and 2.70 with standard deviations 0.544, 0.478, 0.643, 0.835, and 0.515 respectively.

The mean scores of the internal dimensions of lead-time of the materials to be supplied, supply chain policy of the organization, information technology of the organization, training and development programs and socioeconomic factors of the organization suggest that respondents in the respective field offices of International Rescue Committee – Ethiopia Program believe that only minimal efforts have been made to promote supply chain efficiency with key indicators in the organization except in the case of sociopolitical factors, institutional donor factor and supply chain efficiency of the organization in which case the score depict that efforts being exerting moderately. These imply the fact that the job engagement attempts made by respective field offices and head office supply chain performers are not as such significant pertaining to strategic plan of response to emergencies and alleviating human sufferings and decreasing lead times of materials to be supplied and/or service provisions. It also suggests that the existing platform for the timely performing of supply chain activities with the prevailing information technology enabler and supply chain policy, SOPs and manuals, are only moderate in speeding up logistical emergency responses. The same is true for training and development scheme of the organization to supply chain department as it is moderate and depict that there is no training and development scheme to enhance and fortify supply chain department and to go with the dynamic socioeconomic factors.

4.4.2. Respondents' perception on supply chain efficiency

The mean score of the scale of supply chain efficiency of the organization is 2.92 as depicted on the aforementioned table with standard deviation of 0.672. This score is very marginally higher relative to the mean scores of the low scoring dimensions. However, the fact that the composite mean score is only 2.92 suggests that respondents were rating their respective field offices' supply chain efficiency as moderate.

4.5. Correlation Analysis

Correlation analysis was conducted to determine whether a statistically significant relationship exists between the dimensions of supply chain factors (i.e. lead time of the materials to be procured, information communication technology, supply chain policies, training and development programs, socio economic factors, institutional donors factor, and socio political factors) and supply chain efficiency. Correlation analysis helps to determine the relationship among variables by giving insight on the strength and direction of relationship. The coefficient of correlation could take values ranging from -1 to +1, where the signs signifying the direction of relationship. A correlation value of 0 implies the absence of relationship among variables, a result between 0.1 and 0.3 indicates weak relationship, whereas a result between 0.4 and 0.6, and 0.7 and 0.9 imply respectively moderate and strong relationships among variables, while a correlation coefficient of 1 suggests a perfect relationship (Dancy and Reidy, 2004).

The result of the correlation analysis conducted to assess the association between the dimensions of lead time of the materials to be procured, information communication technology, supply chain policies, training and development programs, socio economic factors, institutional donors factor, and socio political factors) and supply chain efficiency is presented on the subsequent table:

Table 4.4. Compounded Correlation Coefficients

	Supply Chain Efficiency	
	Pearson Correlation	Significance (2-tailed)
Lead time	.882 ^{**}	.000
Information technology	.675 ^{**}	.000
Supply chain policy	.501 ^{**}	.000
Training & development	.632 ^{**}	.000
Socio economic factors	.824 ^{**}	.000
Institutional donors factors	.842 ^{**}	.000
Socio political factors	.803 ^{**}	.000
**Correlation is significant at the 0.01 level (2-tailed).		
Listwise N=78		

Source: Survey result, 2018

The above table 4.4 clearly indicated that moderate positive relationships have been identified between lead time of materials to be procured and supply chain efficiency ($r=0.882$, $p=0.00$), and between information technology and supply chain efficiency ($r= 0.675$, $p=0.00$). Whereas, between supply chain policy and supply chain efficiency ($r = 0.501$, $p=0.00$) and between socio economic factors and supply chain efficiency it is ($r= 0.824$, $p=0.00$). The correlation for institutional donor factors and supply chain efficiency is indicated as ($r=0.842$, $p=0.00$) while between socio political factors and supply chain efficiency it is ($r=0.803$, $p=0.00$).

To sum up the correlations of dimensions strong positive association have been identified between lead time, information technology, socio economic factors, institutional donors factors, and socio political factors with supply chain efficiency of the organization. The relationships are statistically significant at 99% confidence level. The results suggest that all the dimensions have positive relationship with supply chain efficiency of the International rescue Committee, though the strength of relationship is somehow different from the dimensions involved.

This implies that measures that must be taken for supply chain efficiencies, such as on time delivery of materials requested, meet International Rescue Committee's supply chain time

threshold, liaise and coordinate the time requesters' demand on purchase requisitions are reasonable and diligently monitor suppliers and service providers. The other supply chain enabler to be enhanced is the Budget vis-à-vis Actual (BVA) software; software for humanitarian supply chain better to be swift, consistent, user friendly and should work offline to speed up the emergency response activities throughout the country. The organization should also consider the now and then changing of standard operating procedures (SOPs) of supply chain guidelines for smooth operations. Furthermore, the above implications extend the organization to establish long term contracts with potential suppliers and service providers in all field offices, avoid language barriers while communicating with suppliers, and use of safety stocks for some selected items. Conducting regular visits to suppliers' sites, sharing of relevant, timely and accurate information with suppliers, are by some means positively related to how the IRC supply chain perform in assuring reduced cost of logistics, attain value for money, meet internal and external customers demand. Apart from the above compounded correlation analysis, separate correlation analyses had also been made to reveal the relationship between the seven dimensions of factors affecting supply chain efficiency in humanitarian organizations. Hence, the results of the separate correlation analyses made between the dimensions of the dependent variable and the individual measures of effective supply chain performance are provided as follows:

Table 4.5. Lead time and individual measures of supply chain efficiency

		SC has reduce d costs of inputs	SC attain VFM	Train Develop and Empower SC staffs	SC have stable connectivity	SC Meet LT	SC meets customers satisfaction	Local Markets fulfill need, suppliers are business mind, reliable & ethical
Lead time	Pearson Correlation	.424**	.172	.328**	.298**	.513**	.543**	.525**
	Sig. (2-tailed)	.000	.132	.003	.008	.000	.000	.000
	N	78	78	78	78	78	78	78
**. Correlation is significant at the 0.01 level (2-tailed).								

Source: Survey result, 2018

As clearly shown on the table, independent variable named lead time of the materials to be procured has a significant positive relationship with all of the individual inputted measures of supply chain efficiency taken separately (at the $p=0.01$ level). Worth noting at this additional sub variables correlation matrix is the fact that the strengths of the correlations are relatively weaker relative to the major variables compounded correlation coefficients which are statistically significant and present of a sub variable with p-value of insignificant. As far as the comparison of the strengths of relationship that information technology has with the individual measures of supply chain efficiency is concerned, it has been found that information technology has relatively strongest relationship with supply chain meets customers satisfaction followed by the relationship it has exhibited with local markets fulfill need, suppliers are business minded, reliable & ethical.

Table 4.6. Information technology and individual measures of supply chain efficiency

		IRC SC has reduced cost	IRC SC attain VFM	IRC train and Develop Empower SC	IRC SC have stable Connecti vity	SC Meet LT	SC meets customers satisfaction	Local Markets fulfill need, suppliers are business mind, reliable & ethical
Information technology	Pearson Correlation	.292**	.162	.271*	.411**	.558**	.564**	.613**
	Sig. (2-tailed)	.009	.156	.016	.000	.000	.000	.000
	N	78	78	78	78	78	78	78
**. Correlation is significant at the 0.01 level (2-tailed).								
*. Correlation is significant at the 0.05 level (2-tailed).								

Source: Survey result, 2018

As clearly shown on the table, information technology of the organization has a significant positive relationship with all of the individual inputted measures of supply chain efficiency taken separately (at the $p=0.01$ and $p=0.05$ levels). Attention capturing point here is the fact that the strengths of the correlations are relatively weaker relative to the above all statistically significant compounded correlation coefficients. As far as the comparison of the strengths of relationship

that information technology has with the individual measures of supply chain efficiency is concerned, it has been found that information technology has relatively strongest relationship with local markets fulfill needs, suppliers are business mind, reliable and ethical followed by the relationship it has exhibited with supply chain department meets customers satisfaction.

Table 4.7. Supply chain Policy and individual measures of supply chain efficiency

		SC has reduce d costs of inputs	SC attain VFM	Train Develop and Empower SC staffs	SC have stable connectivi ty	SC Meet LT	SC meets customers satisfaction	Local Markets fulfill need, suppliers are business mind, reliable & ethical
SC policy	Pearson Correlation	.314**	.178	.296**	.197	.284*	.411**	.273*
	Sig. (2-tailed)	.005	.119	.009	.084	.012	.000	.016
	N	78	78	78	78	78	78	78
**. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed).								

Source: Survey result, 2018

As clearly shown on the table, independent variable named supply chain policy of the organization has a significant positive relationship with all of the individual inputted measures of supply chain efficiency taken separately (at the $p=0.01$ and $p=0.05$ levels). At this additional sub variables correlation matrix the strengths of the correlations are relatively weaker relative to the major variables compounded correlation coefficients the study revealed on previous page which are statistically significant, and the presence of a sub variable with p-value of insignificant. As far as the comparison of the strengths of relationship that supply chain policy has with the individual measures of supply chain efficiency is concerned, it has been found that supply chain policy has relatively strongest relationship with SC meets customers satisfaction followed by the relationship it has exhibited with supply chain has reduced costs of inputs.

Table 4.8. Training & development and individual measures of supply chain efficiency

		SC has reduced costs of inputs	SC attain VFM	Train Develop and Empower SC staffs	SC have stable connectivity	SC Meet LT	SC meets customers satisfaction	Local Markets fulfill need, suppliers are business mind, reliable & ethical
Training & development	Pearson Correlation	.363**	.154	.228*	.236*	.352**	.372**	.296**
	Sig. (2-tailed)	.001	.178	.045	.038	.002	.001	.008
	N	78	78	78	78	78	78	78
**. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed).								

Source: Survey result, 2018

As clearly shown on the table, independent variable named training and development program of the organization has a significant positive relationship with all of the individual inputted measures of supply chain efficiency taken separately (at the $p=0.01$ and $p=0.05$ levels). At this additional sub variables correlation matrix the strengths of the correlations are relatively weaker relative to the major variables compounded correlation coefficients the study revealed on previous page which are statistically significant, and the presence of a sub variable with p-value of insignificant. As far as the comparison of the strengths of relationship that training and development program of the organization has with the individual measures of supply chain efficiency is concerned, it has been found that training and development program of the organization has relatively strongest relationship with supply chain meets customers satisfaction followed by the relationship it has exhibited with supply chain has reduced costs of inputs.

Table 4.9. Socio economic factors and individual measures of supply chain efficiency

		SC has reduced costs of inputs	SC attain VFM	Train Develop and Empower SC staffs	SC have stable connectivity	SC Meet LT	SC meets customers satisfaction	Local Markets fulfill need, suppliers are business mind, reliable & ethical
Socioeconomic factors	Pearson Correlation	.331**	.181	.317**	.278*	.540**	.563**	.602**
	Sig. (2-tailed)	.003	.113	.005	.014	.000	.000	.000
	N	78	78	78	78	78	78	78
**. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed).								

Source: Survey result, 2018

As clearly shown on the table, independent variable named socioeconomic factor has a significant positive relationship with all of the individual inputted measures of supply chain efficiency taken separately (at the $p=0.01$ and $p=0.05$ levels). At this additional sub variables correlation matrix the strengths of the correlations are relatively weaker relative to the major variables compounded correlation coefficients the study revealed on previous page which are statistically significant, and the presence of a sub variable with p-value of insignificant. As far as the comparison of the strengths of relationship that socioeconomic factor of the organization has with the individual measures of supply chain efficiency is concerned, it has been found that socioeconomic factor has relatively strongest relationship with local markets fulfill need, suppliers are business mind, reliable & ethical followed by the relationship it has exhibited with SC meets customers satisfaction.

Table 4.10. Institutional donors' factors and individual measures of supply chain efficiency

		SC has reduced costs of inputs	SC attain VFM	Train Develop and Empower SC staffs	SC have stable connectivity	SC Meet LT	SC meets customers satisfaction	Local Markets fulfill need, suppliers are business mind, reliable & ethical
Institutional donors	Pearson Correlation	.323**	.090	.305**	.373**	.555**	.491**	.634**
	Sig. (2-tailed)	.004	.433	.007	.001	.000	.000	.000
	N	78	78	78	78	78	78	78
**. Correlation is significant at the 0.01 level (2-tailed).								

Source: Survey result, 2018

As clearly shown on the table, independent variable named institutional donors has a significant positive relationship with all of the individual inputted measures of supply chain efficiency taken separately (at the $p=0.01$ level). At this additional sub variables correlation matrix the strengths of the correlations are relatively weaker relative to the major variables compounded correlation coefficients the study revealed on previous page which are statistically significant, and the presence of a sub variable with p-value of insignificant. As far as the comparison of the strengths of relationship that institutional donors has with the individual measures of supply chain efficiency is concerned, it has been found that institutional donors has relatively strongest relationship with local markets fulfill needs, suppliers are business minded, reliable & ethical followed by the relationship it has exhibited with supply chain meets customers satisfaction.

Table 4.11. Socio political factors and individual measures of supply chain efficiency

		SC has reduced costs of inputs	SC attain VFM	Train Develop and Empower SC staffs	SC have stable connectivity	SC Meet LT	SC meets customers satisfaction	Local Markets fulfill need, suppliers are business mind, reliable & ethical
Socio political factors	Pearson Correlation	.494 **	.328 **	.352 **	.442 **	.498 **	.512 **	.529 **
	Sig. (2-tailed)	.000	.003	.002	.000	.000	.000	.000
	N	78	78	78	78	78	78	78
**. Correlation is significant at the 0.01 level (2-tailed).								

Source: Survey result, 2018

As clearly shown on the table, independent variable named socio political factors has a significant positive relationship with all of the individual inputted measures of supply chain efficiency taken separately (at the $p=0.01$ level). At this additional sub variables correlation matrix the strengths of the correlations are relatively weaker relative to the major variables compounded correlation coefficients the study revealed on previous page which are statistically significant. As far as the comparison of the strengths of relationship that socio political factors has with the individual measures of supply chain efficiency is concerned, it has been found that socio political factors has relatively strongest relationship with local markets fulfill needs, suppliers are business minded, reliable & ethical followed by the relationship it has exhibited with supply chain meets customers satisfaction.

4.6. Testing Assumptions of Linear Regression Model

Test of Normality Assumption: Normal distribution of the variables is one of the linear regression model requirement or assumptions that have to be met up. This means that errors terms are normally distributed, and that a plot of the values of the residuals will approximate a normal distribution curve. And, if the error terms not normally distributed, the linear relationships and significance test can be distorted (Osborne & Waters, 2002). Therefore, this was no normality assumption problem for this study. This is shown on Appendix C.

Test of Homoscedasticity Assumption: This assumption states that the variances of error terms are similar across the values of the independent variables. When the variance of errors differs at different values of the independent variable, heteroscedasticity is indicated. Tadesse Y. (2017) mentioning the works of Berry and Feldman (1985) and Tabachnick and Fidell (1996) he has described that slight heteroscedasticity has little effect on significance tests; however, when heteroscedasticity is marked it can lead to serious distortion of findings and seriously weaken the analysis thus increasing the possibility of a Type I error. This assumption can be checked by visual examination of a plot of the standardized residuals (the errors) by the regression standardized predicted value. Thus, as shown on the appendix D, there was no heteroskedasticity problem for this study.

Test of Multicollinearity Assumptions: Multicollinearity refers to the situation in which the independent variables are highly correlated in a way that has undesirable implication on the outcome of regression analysis. According to Robert (2006), if collinearity is discovered then one can either remove one of the variables or create a new variable that combine the previous two that were highly intercorrelated because when the predictor variables are highly correlated, they share essentially the same information and together, they may explain a great deal of the dependent variable, but may not individually contribute significantly to the model. Thus, the impact of multicollinearity is to reduce any individual independent variable's predictive power by the extent to which it is associated with the other independent variables (Beyan, 2014).

Accordingly, Tolerance and Variance Inflation Factor (VIF) values were calculated to check multicollinearity and the result is presented on table 4.12 below. The Tolerance value is an indication of the percentage of variance in the predictor that cannot be accounted for by the other

predictors implying the fact that very small values indicate overlap or sharing of predictive power (Robert, 2006). Therefore, this was not a problem for this study.

Table 4.12. Multicollinearity Test

Model		Collinearity Statistics	
		Tolerance	VIF
1	Lead Time of materials	0.16	6.241
	Information technology	0.116	8.621
	IRC SC policy	0.357	2.801
	Training and development	0.557	1.796
	Socioeconomic factors	0.118	8.467
	Institutional donors factors	0.175	5.717
	Socio political factors	0.159	6.272

a. Dependent Variable: SC efficiency of the org

As shown on the table, the Tolerance values for all the independent variables are within the acceptable level of closer to 0. Several eigenvalues are close to 0, indicating that the predictors are highly intercorrelated and that small changes in the data values may lead to large changes in the estimates of the coefficients. The VIF values are also less than 10. If the VIF values of independent variables are beyond 10, then it is suggested that further investigation is required (Robert, 2006). As implied by the Tolerance and VIF values, in this particular case, multicollinearity is not a serious problem.

4.7. Regression analysis

In an effort to determine how the dimensions of the independent variable predict the dependent variable, multiple linear regression analysis was conducted. Multiple linear regression analysis is a method of estimating or predicting a value on some dependent variable given the values of one or more independent variables. Unlike correlations, the primary purpose of regression is prediction (Marczyk G, DeMatteo D, and Festinger D, 2005). Hence, through the analysis of multiple linear regressions, an attempt has been made to determine the magnitude of the predicting power of the dimensions of the independent variable (i.e. lead time of the materials to be procured, information communication technology, supply chain policies, training and development programs, socio economic factors, institutional donors factor, and socio political

factors) on the dependent variable (i.e. supply chain efficiency). However, test of multicollinearity was conducted before the regression analysis.

Table 4.13. Regression Analysis Result

Model Summary	R	R Square		Adjusted R Square	Std. Error of the Estimate	
	.927 ^a	.859		.845	0.2643	
Coefficients	Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	(Constant)	.406	.213		1.908	.061
	Lead Time	.143	.138	.116	1.035	.304
	Information technology	.647	.138	.619	4.701	.000
	IRC SC policy	-.423	.106	-.301	-4.011	.000
	Training and development	-.050	.048	-.062	-1.039	.303
	Socioeconomic	.570	.170	.437	3.348	.001
	Institutional donors	.103	.131	.084	.788	.433
	Socio political	-.074	.147	-.056	-.502	.617
a. Dependent Variable: SC efficiency of the org						
b. Predictors: (Constant), Socio political factors, Training and development program, IRC SC policy, Institutional donors factors, Lead Time of materials, Socioeconomic factors, Information Communication technology						

Source: Survey result, 2018

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	29.865	7	4.266	61.056	.000 ^b
	Residual	4.891	70	.070		
	Total	34.756	77			

- a. Dependent Variable: SC efficiency of the org
- b. Predictors: (Constant), Socio political factors, Training and development program, IRC SC policy , Institutional donors factors, Lead Time of materials, Socioeconomic factors, Information Communication technology

The ANOVA table indicate that the overall model was in a good fit with statistical (F – value =61.056 and P-value = .000 < 0.01. In a multiple linear regression analysis of such sort, ANOVA test shows the acceptability of the model from statistical perspective. Accordingly, the regression row indicates the extent of variation explained by the model, whereas the residual row indicates information about the variation that is not accounted for the model, i.e. variation on the dependent variable explained by factors not included in the model.

IT, SC policy and socioeconomic factors have significant effect on the dependent variables. But, the others have an insignificant effect on the dependent variable. This does not mean that, variables which are insignificant have no effect; it may be associated had all mail surveys were returned.

International Rescue Committee – Ethiopia program’s supply chain efficiency therefore is

$$Y = a + \beta_1 * X_1 + \beta_2 * X_2 + \beta_3 * X_3 + \beta_4 * X_4 + \dots X_n + e$$

$$Y = 0.406 + 0.116X_1 + .619X_2 - .301X_3 - .062X_4 + .437X_5 + .084X_6 - .056X_7 + e$$

The Adjusted R Square value on the model summary table is a representation of the correlation between the observed values of the dependent variable, i.e. supply chain efficiency of International Rescue Committee – Ethiopia Program and the values of the same dependent variable predicted by the multiple regression models. Hence, it suggested that larger value of the Adjusted R Square represents a large correlation between the predicted and observed values of the dependent variable (Chandan, 2011). As clearly depicted on the model summary, the value for Adjusted R Square is 0.845 suggesting that 84.50% of the variation in the dependent variable (i.e. supply chain efficiency of International Rescue Committee – Ethiopia Program office) is explained by the model, i.e. by the combined variance in the dimensions of the independent variable, namely lead time of the materials to be procured, information communication technology, supply chain policies, training and development programs, socio economic factors,

institutional donors factor, and socio political factors. The remaining 15.50% of the variation on the dependent variable is, therefore, explained by factors not incorporated in the model. Information technology has the biggest impact with value of on supply chain efficiency followed by socioeconomic factor with $\beta = 0.647$ and 0.570 respectively. Though the model is fit to be used for further interpretation as shown on the ANOVA table, a closer look at the coefficients of all independent variable shows that they have statistically significant (at $p < 0.05$ and $p < 0.01$).

4.7.1. Multiple regression analysis result

Table 4.14. Model Summary and Coefficients: for individual variables of LT and SC efficiency

Model Summary	R	R Square		Adjusted R Square	Std. Error of the Estimate	
	.814 ^a	0.6628		.639	0.4035	
Coefficients	Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	(Constant)	.654	.281		2.327	.023
	On time delivery	-.044	.078	-.042	-.559	.578
	Estimated Lead time	.040	.055	.055	.730	.468
	Users consider time	.113	.062	.130	1.833	.071
	Suppliers meet lead time	.225	.064	.265	3.516	.001
	Customers are satisfied	.489	.052	.699	9.345	.000
a. Dependent Variable: SC efficiency of the org						
b. Predictors: (Constant), On time delivery, Estimated Lead time, Users consider time , Suppliers meet lead time, internal Customers are satisfied						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	23.035	5	4.607	28.299	.000 ^b
	Residual	11.721	72	.163		
	Total	34.756	77			
a. Dependent Variable: SC efficiency of the org.						
b. Predictors: (Constant), Internal Customers are satisfied, Users consider time, Estimated Lead time, Suppliers meet lead time, On time delivery						

Source: Survey result, 2018

As shown in the above model summary table, the adjusted R Square is 0.639, this suggest that about 64% of the variation in the model is explained by the variables already incorporated in to the model. Therefore, in this particular case 0.639 R Square value revealed that about 64% of the variation in the supply chain efficiency explained by the variables existed in the model. This further shows that only 36% of the variation in the dependent variable is to be determined by the variables outside of this model.

Although the model fitness is confirmed as presented in the ANOVA table, as far as the coefficient table is concerned only suppliers meet lead time and internal customers are satisfied, are statistically significant (at $p < 0.01$ level). From their beta values these two independent variables are relatively important in measuring the dependent variable - supply chain efficiency. The remaining statistically insignificant variables (i.e. on time delivery, users consider time the demand the materials, estimated lead time of the organization for different categories) are statistically failed to explain the dependent variable namely supply chain efficiency due to they scored p value out of the acceptable range ($p < 0.05$). In relation to the measuring power of the two statistically significant variables the coefficient table revealed that suppliers meet lead time has a predicting standardized coefficient of 0.265 and internal customers are satisfied scored standardized coefficient of 0.699.

Looking individual members of LT - suppliers meet lead time and internal customers are satisfied have significant effect on the dependent variables. But, the others have an insignificant effect on the dependent variable. This does not mean that, variables which are insignificant have no effect; it may be associated had all mail surveys were returned.

In evaluating each independent variables' impact on dependent variable (supply chain efficiency), the table shows that internal customers are satisfied, users consider time, meet estimated lead time, suppliers meet lead time, on time delivery which are the independent variables have a positive coefficient (except on time delivery with -0.42) β values which indicates that lead time of the materials to be procured dimensions contribute negatively and insignificantly to supply chain efficiency.

Internal customers are satisfied, has the biggest impact with value of $\beta = 0.699$ on supply chain efficiency followed by suppliers meet lead time and Users consider time with value of $\beta = 0.265$

and 0.130 respectively comparing them with remaining variables. Estimated lead time and on time delivery have the lowest insignificant impact with value of $\beta = 0.055$ and $\beta = -0.42$ respectively.

As the value of R squared shows, in aggregate the dependent variable (supply chain efficiency) is explained (impacted) by all independent variables (Internal Customers are satisfied, Users consider time, Estimated Lead time, Suppliers meet lead time, on time delivery) by 66.30 percent which shows the evaluation of the model. This R square is not over estimated while evaluating the model's fitness as its variation from adjusted R square is not big. As depicted in the ANOVA table the significance value of F statistics is 0.000 which is less than 0.05. This also shows that there is a significant relationship between the dependent and independent variables.

Table 4.15. Model Summary and Coefficients: individual variables of IT & SC efficiency

Model Summary	R		R Square		Adjusted R Square		Std. Error of the Estimate	
	.914 ^a		0.835		.821		0.2843	
Coefficients			Unstandardized Coefficients		Standardized Coefficients			
			B	Std. Error	Beta	t		
	(Constant)		.835	.165			5.073	.000
	IRC have well designed IT system		.247	.055	.364	4.468	.000	
	IRC offices and camps are well connected		.389	.054	.573	7.259	.000	
	IRC have stable connectivity for BVA		.093	.041	.112	2.251	.027	
	There is a need to BVA backup and offline		.089	.046	.118	1.928	.058	
	BVA is user friendly		-.060	.061	-.057	-.986	.327	
	There is a need for ERP		.005	.045	.007	.103	.918	
a. Dependent Variable: SC efficiency of the org								
b. Predictors: (Constant), There is a need for ERP, IRC have stable connectivity for BVA, IRC offices and camps are well connected, BVA is user friendly, There is a need to BVA backup and offline, IRC have well designed IT system								
Model			Sum of Squares	df	Mean Square	F	Sig.	
1	Regression		29.017	6	4.836	59.826	.000 ^b	
	Residual		5.739	71	.081			
	Total		34.756	77				
a. Dependent Variable: SC efficiency of the org								
b. Predictors: (Constant), There is a need for ERP, IRC have stable connectivity for BVA, IRC offices and camps are well connected, BVA is user friendly, There is a need to BVA backup and offline, IRC have well designed IT system								

Source: Survey result, 2018

As shown in the above model summary table, the adjusted R Square is 0.821, this suggests that 82.10% of the variation in the model is explained by the variables already incorporated into the

model. Therefore, in this particular case 0.835 R Square value revealed that 83.50% of the variation in the supply chain efficiency explained by the variables existed in the model. This further shows that only 16.50% of the variation in the dependent variable is to be determined by the variables outside of this model.

Although the model fitness is confirmed as presented in the ANOVA table, as far as the coefficient table is concerned variables IRC have stable connectivity for BVA (at $p < 0.05$ level), and IRC have well designed IT system, and IRC offices and camps are well connected by internet, are statistically significant (at $p < 0.01$ level). From their beta values these three independent variables are relatively important in measuring the dependent variable (supply chain efficiency). The remaining variables named there is a need to BVA backup and offline, BVA is user friendly and There is a need for ERP are statistically insignificant variable and statistically failed to explain the dependent variable namely supply chain efficiency since it scored p-value out of the acceptable range ($p < 0.05$). This does not mean that, variables which are insignificant have no effect; it may be associated had all mail surveys were returned.

In relation to the measuring power of the four statistically significant variables the coefficient table revealed that IRC have stable connectivity, IRC have well designed IT system, and IRC offices and camps are well connected by internet has a predicting standardized coefficients of 0.112, 0.364, & 0.573 respectively.

Table 4.16. Model Summary and Coefficients: for individual variables of SC Policy and SC efficiency

Model Summary	R	R Square		Adjusted R Square	Std. Error of the Estimate	
	.927 ^a	0.8590		.849	0.2609	
Coefficients	Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	(Constant)	.675	.160		4.211	.000
	IRC have well established policy	.109	.041	.133	2.630	.010
	PRs filled properly	.108	.041	.143	2.663	.010
	SOPs change rapidly	.106	.053	.157	1.982	.051
	SC processes are highly bureaucratic	.196	.048	.300	4.050	.000
	Segregation of duty is well exercised	.293	.055	.452	5.331	.000
a. Dependent Variable: SC efficiency of the org						
a. Predictors: (Constant), Segregation of duty is well exercised, IRC have well established policy, PRs filled properly, SC processes are highly bureaucratic, SOPs change rapidly						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	29.855	5	5.971	87.727	.000 ^b
	Residual	4.901	72	.068		
	Total	34.756	77			
a. Dependent Variable: SC efficiency of the org						
b. Predictors: (Constant), Segregation of duty is well exercised, IRC have well established policy, PRs filled properly, SC processes are highly bureaucratic, SOPs change rapidly						

Source: Survey result, 2018

As shown in the above model summary table, the adjusted R Square is 0.859, this suggest that 85.90% of the variation in the model is explained by the variables already incorporated into the model. Therefore, in this particular case 0.859 R Square value revealed that 85.90% of the variation in the supply chain efficiency explained by the variables existed in the model. This

further shows that only 14.10% of the variation in the dependent variable is to be determined by the variables outside of this model.

Although the model fitness is confirmed as presented in the ANOVA table, as far as the coefficient table is concerned variables IRC have well established policy, purchase requisitions are filled properly, SC processes are highly bureaucratic, Segregation of duty is well exercised are statistically significant (at $p < 0.05$ and $p < 0.01$ respectively). From their beta values these four independent variables are relatively important in measuring the dependent variable (supply chain efficiency). The remaining (SOPs change rapidly) is statistically insignificant variable is statistically failed to explain the dependent variable namely supply chain efficiency since it scored p- value out of the acceptable range ($p < 0.05$). In relation to the measuring power of the four statistically significant variables the coefficient table revealed that IRC have well established policy, purchase requisitions are filled properly, SC processes are highly bureaucratic, and segregation of duty is well exercised has a predicting standardized coefficient of 0.133, 0.143, 0.300 & 0.452 respectively.

Table 4.17. Model Summary and Coefficients: individual variables of Training and development and SC efficiency

Model Summary	R	R Square		Adjusted R Square	Std. Error of the Estimate	
	.853 ^a	0.7283		.705	0.3647	
Coefficients	Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	(Constant)	.146	.302		.485	.629
	I have got BVA training	.025	.052	.035	.480	.633
	SC have adequate Staff number	.033	.064	.034	.522	.603
	Conducive for knowledge sharing	-.010	.053	-.014	-.197	.844
	SC staffs attend Training and devt	.199	.059	.224	3.347	.001
	IRC SC staffs have access to Certificate	.245	.057	.295	4.338	.000
	Self learning is appreciated	.495	.050	.671	9.852	.000
a. Dependent Variable: SC efficiency of the org						
b. Predictors: (Constant), Self learning is appreciated, SC have adequate Staff number, Conducive for knowledge sharing, SC staffs attend Training and devt, IRC SC staffs have access to Certificate, I have got BVA training						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	25.312	6	4.219	31.716	.000 ^b
	Residual	9.444	71	.133		
	Total	34.756	77			
a. Dependent Variable: SC efficiency of the org						
b. Predictors: (Constant), Self learning is appreciated, SC have adequate Staff number, Conducive for knowledge sharing, SC staffs attend Training and dev't, IRC SC staffs have access to Certificate, I have got BVA training						

Source: Survey result, 2018

As shown in the above model summary table, the adjusted R Square is 0.705, this suggest that 70.50% of the variation in the model is explained by the variables already incorporated in to the model. Therefore, in this particular case 0.705 R Square value revealed that 70.50% of the variation in the supply chain efficiency explained by the variables existed in the model. This further shows that only 29.50% of the variation in the dependent variable is to be determined by the variables outside of this model.

Although the model fitness is confirmed as presented in the ANOVA table, as far as the coefficient table is concerned SC staffs attend training and development, IRC SC staffs have access to certificate and self learning is appreciated are statistically significant (at $p < 0.01$ level). From their beta values these three independent variables are relatively important in measuring the dependent variable (supply chain efficiency). The remaining statistically insignificant variables (i.e. SC have adequate staff number, I have got BVA training, and conducive for knowledge sharing) are statistically failed to explain the dependent variable namely supply chain efficiency since they scored p-value out of the acceptable range ($p < 0.05$). This does not mean that, variables which are insignificant have no effect; it may be associated had all mail surveys were returned. In relation to the measuring power of the three statistically significant variables the coefficient table revealed that supply chain staffs attend training and development programs, IRC's supply chain staffs have an access to certification courses and self learning is appreciated have a predicting standardized coefficient of 0.224, 0.295 and 0.671 respectively.

Table 4.18. Model Summary and Coefficients: individual variables of socio economic factors and SC efficiency

Model Summary	R	R Square		Adjusted R Square	Std. Error of the Estimate	
	.931 ^a	0.867		.851	0.2591	
Coefficients	Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	(Constant)	.417	.176		2.372	.020
	IRC SC have Contracted for most categories	.193	.047	.299	4.097	.000
	Most vendors have Knowhow	.172	.050	.251	3.427	.001
	Requests made by IRC understood easily by SS	-.053	.039	-.074	-1.375	.173
	IRC face competition for materials	.039	.050	.041	.779	.439
	Language translation is needed	.056	.037	.082	1.510	.136
	Materials are available from local	.110	.042	.129	2.638	.010
	Markets are unstable	.100	.042	.127	2.420	.018
	PRs are not clear	.276	.045	.406	6.105	.000
a. Dependent Variable: SC efficiency of the org						
b. Predictors: (Constant), PRs are not clear, Markets are unstable, Materials are available from local, Requests made by IRC understood easily by SS, IRC face Competition for material, Language translation is needed, IRC SC have Contracted for most categories, Most vendors have Knowhow						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	30.122	8	3.765	56.070	.000 ^b
	Residual	4.634	69	.067		
	Total	34.756	77			
a. Dependent Variable: SC efficiency of the org						
b. Predictors: (Constant), PRs are not clear, Markets are unstable, Materials are available from local, Requests made by IRC understood easily by SS, IRC face Competition for material, Language translation is needed, IRC SC have Contracted for most categories, Most vendors have Knowhow						

Source: Survey result, 2018

As shown in the above model summary table, the adjusted R Square is 0.851, this suggest that 85.10% of the variation in the model is explained by the variables already incorporated in to the model. Hence, in this particular case 0.851 R Square value revealed that 85.10% of the variation in the supply chain efficiency explained by the variables existed in the model. This further shows that only 14.90% of the variation in the dependent variable is to be determined by the variables outside of this model.

Although the model fitness is confirmed as presented in the ANOVA table, as far as the coefficient table is concerned markets are unstable and IRC's SC have contracted suppliers for most categories of materials, most vendors have knowhow of products, most materials are available from local and PRs are not clear are statistically significant (at $p < 0.05$ and $p < 0.01$ respectively). From their beta values these five independent variables are relatively important in measuring the dependent variable (supply chain efficiency). The remaining statistically insignificant variables (i.e. Requests made by IRC understood easily by suppliers, IRC face competition for materials, and language translation is needed) are statistically failed to explain the dependent variable namely supply chain efficiency since they scored p-value out of the acceptable range ($p < 0.05$). This does not mean that, variables which are insignificant have no effect; it may be associated had all mail surveys were returned. In relation to the measuring power of the five statistically significant variables the coefficients table revealed that markets are unstable have a predicting standardized coefficient of 0.127. And IRC's SC have contracted suppliers for most categories of materials, most vendors have knowhow of products, most materials are available from local and PRs are not clear have a predicting standardized coefficient of 0.299, 0.251, 0.129 and 0.406 respectively.

Table 4.19. Model Summary and Coefficients: individual variables of donor and SC efficiency

Model Summary	R	R Square		Adjusted R Square	Std. Error of the Estimate	
	.708 ^a	0.5009		.474	0.4875	
Coefficients	Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	(Constant)	1.228	.242		5.067	.000
	Donors accept all policies	.330	.064	.511	5.177	.000
	Donors regulations are bottle neck	.140	.060	.219	2.337	.022
	Donors funding are flexible	-.054	.059	-.082	-.919	.361
	Donors funding allot for SC	.194	.065	.254	2.994	.004
a. Dependent Variable: SC efficiency of the org						
b. Predictors: (Constant), Donors funding allot for SC, Donors regulations are bottle neck, Donors funding are flexible, Donors accept all policies						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	17.410	4	4.353	18.318	.000 ^b
	Residual	17.346	73	.238		
	Total	34.756	77			
a. Dependent Variable: SC efficiency of the org						
b. Predictors: (Constant), Donors funding allot for SC, Donors regulations are bottle neck, Donors funding are flexible, Donors accept all policies						

Source: Survey result, 2018

As shown in the above model summary table, the adjusted R Square is 0.474, this suggest that 47.40% of the variation in the model is explained by the variables already incorporated in to the model. Hence, in this particular case 0.500 R Square value revealed that 47.40% of the variation in the supply chain efficiency explained by the variables existed in the model. This further shows that only 52.60% of the variation in the dependent variable is to be determined by the variables outside of this model.

Although the model fitness is confirmed as presented in the ANOVA table, as far as the coefficient table is concerned donors regulations are bottle neck for supply chain function (at $p < 0.05$) and institutional donor accept IRC's SC policies, donor funding allot fund for SC and donors funding are flexible are statistically significant (at $p < 0.01$). From their beta values these four independent variables are relatively important in measuring the dependent variable (supply chain efficiency). The remaining statistically insignificant variable (i.e. donors funding are flexible) are statistically failed to explain the dependent variable namely supply chain efficiency since it scored p-value out of the acceptable range ($p < 0.05$). This does not mean that, variables which are insignificant have no effect; it may be associated had all mail surveys were returned. In relation to the measuring power of the four statistically significant variables the coefficient table revealed that donor regulations are bottle neck for supply chain functions have a predicting standardized coefficient of 0.219. And institutional donor accept IRC's SC policies, donor funding allot fund for SC and donors funding are flexible have a predicting standardized coefficient of 0.511, 0.254, and -0.082 respectively.

Table 4.20. Model Summary and Coefficients: individual variables of socio political factor and SC efficiency

Model Summary	R	R Square		Adjusted R Square	Std. Error of the Estimate	
	.768 ^a	0.5897		.555	0.4482	
Coefficients	Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	(Constant)	.580	.308		1.885	.064
	Political Instability have an impact on LT	.071	.055	.100	1.275	.206
	Flexibility of recruit	.119	.073	.131	1.638	.106
	IRC affected by gov't policy	.221	.069	.256	3.199	.002
	70/30 have an effect on SC efficiency	-.079	.072	-.107	-1.096	.277
	Security threat have an effect on remote location	.219	.066	.315	3.343	.001
	IRC have got gov't assist	.312	.068	.446	4.588	.000
	Internal Customers are satisfied	.489	.052	.699	9.345	.000
a. Dependent Variable: SC efficiency of the org						
b. Predictors: (Constant), IRC have got gov't. assist, Flexibility of recruit, Political Instability have an impact on LT, IRC affected by gov't policy, Security threat have an effect on remote, 70/30 have an effect on SC efficiency						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	20.495	6	3.416	17.006	.000 ^b
	Residual	14.261	71	.201		
	Total	34.756	77			
a. Dependent Variable: SC efficiency of the org						
b. Predictors: (Constant), IRC have got gov't. assist, Flexibility of recruit, Political Instability have an impact on LT, IRC affected by Gov't policy, Security threat have an effect on remote, 70/30 have an effect on SC efficiency						

Source: Survey result, 2018

As shown in the above model summary table, the adjusted R Square is 0.555, this suggest that 55.50% of the variation in the model is explained by the variables already incorporated in to the model. Hence, in this particular case 0.59 R Square value revealed that 55.50% of the variation

in the supply chain efficiency explained by the variables existed in the model. This further shows that only 44.50% of the variation in the dependent variable is to be determined by the variables outside of this model.

Although the model fitness is confirmed as presented in the ANOVA table, as far as the coefficient table is concerned IRC affected by government policy, security threat have an effect on remote location, IRC have got government's assistance and internal customers are satisfied are statistically significant (at $p < 0.01$). From their beta values these four independent variables are relatively important in measuring the dependent variable (supply chain efficiency). The remaining statistically insignificant variable (i.e. Political Instability have an impact on lead time, flexibility of recruitment, and regulations of 70/30 have an effect on SC efficiency) are statistically failed to explain the dependent variable namely supply chain efficiency since it scored p-value out of the acceptable range ($p < 0.05$). This does not mean that, variables which are insignificant have no effect; it may be associated had all mail surveys were returned. In relation to the measuring power of the four statistically significant variables the IRC affected by government policy, security threat have an effect on remote location, IRC have got government's assistance and internal customers are satisfied have a predicting standardized coefficients of 0.256, 0.315, 0.446 and 0.699 respectively.

4.8. Result of qualitative data

Findings from an interview with the IRC Ethiopia's Supply Chain Department Head and inputs gained from an open ended question in the survey questionnaire are presented in this part. The informative interview was intended to get an overview on the supply chain system of the organization and the one open ended question in the survey questionnaire was to understand whether employees think there is other major factor and to recommend for improvement of IRC supply chain efficiency.

The supply chain department head - Mr. Asmamaw Adenew has worked for more than 4 years in IRC Ethiopia. Prior to joining IRC he has worked in different international non-governmental organizations (INGOs) both abroad and in Ethiopia in supply chain expertise. After introducing himself he gave an overview about the current level of supply chain management system and practice in the IRC Ethiopia as follows:

For the question raised to understand how well are cost efficiency (value for money), reliability of supply chain (tasks are conducted as expected) functions and effectiveness (within expected time) are met?

“IRC’s supply chain management is trying sustainable acquisition of goods, works, and services to optimize value for money through a professional, auditable, and transparent framework. We have been attempting to achieve maximum value for money i.e. insure economy, efficiency and effectiveness in all supply chain functions.

All evaluation method we are using generally is based on the value of the required procurement. The selection criteria are based on either “Low Bid” or “Value for Money”. It is not mandatory to choose the bid with the lowest price. Value for Money is generally considered “best practice”. Value for Money takes into account factors like maintenance, quality, warranty, and technical support, etc. – as well as cost.

Low Bid is the sole consideration of price in the evaluation of an offer. Low Bid is generally used for the procurement of low-dollar products and services, or when required by a donor.

With respect to the expected tasks and time, supply chain by its nature is dependent on different internal and external factors; in markets like Ethiopia it is hard to attain supply chain expected

tasks within expected time. The reason may be lack of hard currency with respect to potential suppliers and other reasons.”

The supply chain department head - Mr. Yohannes Tsegaye has worked for more than 6 years in IRC Ethiopia. Prior to joining IRC he has worked in different international non-governmental organizations (INGOs) both abroad and in Ethiopia in information technology expertise. After introducing himself he gave an overview about the current IT and system administration Management and practice in the IRC Ethiopia as follows:

For the question raised to understand do you have stable information communication technology for SC functions? And what is the backup software system when internet data are off?

“IRC’s supply chain enabling software is BVA, which is first face of enterprise resource planning (ERP). Most of the time internet is good and consistent especially in urban areas, but in remote locations where IRC is working it is offline. Due to this we have been facing problems to get reports, updates, and overall supply chain function interrupted. In humanitarian functions saving time is saving lives, but if there is no enabling software due to internet or electricity down saving life will be hard to achieve. We have been in hard time recently, while the country was in unrest in some parts and internet was down.

IRC have no mechanism to work backup software system. All the systems we have now are changing into ERP.”

Returning to Mr. Asmamaw Adenew’s reply to: How do you explain the existing delivery date accuracy of the lead time on the country program SC chart is met?

“As I have stated earlier the supply chain activity is inherent with different factors, but the department has been attaining lead times for most procurement objects.”

For the question raised to understand are there formal and/or informal complaints presented to you on the supply chain function operations from programs? If so, which are the major ones?

“Yes we received different complaints (mostly informal) at different times, especially on the emergency program, which is manifested as not having supply chain objects on emergency requests. As you know the market in Ethiopia is unstable and suppliers did not meet lead times

for emergency requests. And for this effect supply chain have a plan to hold some major and recurrently requested items in stock.”

For question posed to understand whether the department has formal training and development programs? If so, what are the methods you use to formally train and develop staffs whose efforts, commitments and achievements are on their peak?

“With requests we have been making the staffs have been taking on line training on the new BVA system, but on the job trainings in emergency response organization it is hard to internalize. We have been attempting to facilitate training for all field offices in Addis at least for 5 days, but due to no budgets allocated from institutional donors to accommodate training and development programs these days, we only avail the online on the job training.”

How do you evaluate the influence of supply chain policy standard operating procedures (SOPs) repeated changes on supply chain efficiency?

“As a big international organization IRC have been working in about 50 countries, these various locations raise different opinions and the organization then will be forced to issue guidelines including all these opinions. Supply chain performs, hence should equip themselves with the new SOPs.”

What were the difficulties and barriers for humanitarian supply chain efficiency in IRC - Ethiopia?

“Major difficulties are longer lead time of the supply chain object mostly due to the market situation, absence of consistent internet connectivity in different regions which lead the IRC to interrupt supply chain activities, lack of budget for off the job training and development program for supply chain staffs, instability and unrest in some parts of the country hindering emergency responses to the needy.”

For question raised by the researcher how could humanitarian supply chain efficiency be mitigated or improved in the organization? Mr. Asmamaw replied as follows:

“IRC Ethiopia supply chain has a plan to establish a long term contract with potential suppliers or service providers in most regional offices and repeated market survey for new potential

entrants and increase relation and collaboration with potential suppliers; this could minimize the stock outs due to the suppliers have a commitment to supply, implementation of offline working software that could enable the organization's supply chain activity uninterrupted, search for budgets for training and development program scheme and avail online certification sources for its staffs."

Finally the supply chain Head said that he believes that, even though there are lots of gaps in the attainment of supply chain efficiency, most of the staffs are effective and strive to achieve the departmental and organizational goals. Despite the internal and external limitations IRC Ethiopia's supply chain have been achieving its goals.

From the interview conducted with the department head we can conclude that there are lots of gaps in supply chain management system. The organization has no offline supply chain enabling software, the organization has no policies and procedures designed to train and develop supply chain staffs, lack of implementation of contracted suppliers in all regional offices, which directly and indirectly associated with longer lead times.

Summary of the answers to the one open ended question asked to get a hint on what employees think the level of supply chain efficiency of the IRC and recommend to the organization regarding the supply chain management system to better improve their supply chain efficiency level, most are mainly recommended the organization to establish offline supply chain enabling software which will work with the prevailing system, implementation of contracted suppliers in all regional offices, avail training and development programs. Besides, the staff suggested that IRC has to develop long term contracts with suppliers and recruit adequate number of supply chain staffs

CHAPTER FIVE

5. SUMMARY OF MAJOR FINDINGS, CONCLUSION AND RECOMMENDATION

5.1. Summary of findings

To meet this objective, quantitative research strategy was adopted and quantitative data was collected from International Rescue Committee – Ethiopia Program supply chain staffs' eight locations throughout the country. Descriptive statistics like frequency, mean, and correlation analysis techniques were applied to analyze background information of respondents, respondents' perception on factors affecting supply chain and supply chain efficiency as well as relationship between supply chain dimensions and dimensions of supply chain efficiency. Besides, regression analysis technique was undertaken to investigate dimensions affecting supply chain, the efficiency of supply chain and to test the hypothesis has been developed. Below are amongst the findings from qualitative data.

- The IT & System manager and most of respondents have asserted that IRC has been affected negatively due to the intermittent internet in the country.
- There is no offline SC enabling software; hence, if internet or electricity downs the overall SC work will be interrupted.
- There are complaints from internal customers.
- There is no budget for SC staffs training and development.
- Absence of consistent long term framework agreements - for all categories in all offices.

A total of 78 respondents had filled and returned the survey questionnaire making the response rate about 82%. About 85% of the respondents were males, while females constituting the remaining 15% of the total respondents. About 87% of the respondents had served for three and above years in their current position implying that the major portion of the response was obtained from respondents who had relatively better information regarding the supply chain function of the organizations, the supply chain policy and systems and associated problems.

From the findings, majority of the respondents said that lead time of materials to be procured, supply chain policy of the organization, supply chain enabling information technology, training and development program for the supply chain staffs, and socioeconomic are factors which are only minimal efforts have been made to promote supply chain efficiency of the International Rescue Committee (IRC – Ethiopia) supply chain efficiency. The above major supply chain factors from the findings have lowest mean of 2.46, 2.49, 2.65, 2.70, 2.70 respectively.

The findings also depicted that, socio political factors and institutional donors funding are factors which are only moderate efforts have been made to promote supply chain efficiency of the International Rescue Committee (IRC –Ethiopia). The above two major factors from the findings have moderate mean of 2.75, 2.88 respectively.

The overall supply chain efficiency of the organization as the findings depicted is being moderately efficient with a mean of 2.92 which implies more need to be done to improve the supply chain function efficiency of the organization.

Correlation coefficient statistics shows that lead time, institutional donors' factor, socioeconomic factor and sociopolitical have strong and significant relationship with supply chain efficiency with coefficients value of 0.882, 0.842, 0.824 and 0.803 respectively, followed by information technology and training and development program with coefficient values of 0.675 and 0.632.

Supply chain policy of the organization has lower correlation with supply chain efficiency compared to other supply chain dimensions and scored mean of 0.501.

After testing the relationship of all independent and dependent variables, the existence of multi - collinearity among these variables was checked and there is no multicollinearity problem among them this leads to do the analysis of regression.

Regression analysis (both linear and multiple regression analysis was undertaken to investigate impacts of each independent variables on dependent variable. All factors of supply chain efficiency namely: lead time, information technology, supply chain policy, training and development, socioeconomic, institutional donor and socio political have significant impact on overall supply chain efficiency of International Rescue Committee – IRC Ethiopia Program with $p < 0.05$ even though their impact is different.

Information technology has strongest impact on supply chain efficiency with $\beta=0.619$ followed by socioeconomic factor with $\beta=0.437$ and the third is institutional donor with $\beta=0.116$. Sociopolitical, training and development and supply chain policy have the least impact on supply chain efficiency with $\beta= -0.056$, -0.062 and -0.301 respectively. As R square value shows, overall supply chain efficiency (dependent variable) is explained by the model which includes lead time of materials to be procured, supply chain policy of the organization, supply chain enabling information technology, training and development program for the supply chain staffs, and socioeconomic factors. The R square value is 0.859 which implies that the supply chain efficiency variable is aggregately impacted or explained by all supply chain factors by 85.90%.

Another finding of this study was that all supply chain dimensions have significant impact on supply chain efficiency.

The most significant impact is shown in information technology dimension with $\beta= 0.619$ followed by socioeconomic dimension with $\beta=0.437$. Based on the finding tangibility has the least impact of tangibility on sub-distributors' satisfaction. The R square value show that the independent variables lead time of materials to be procured, supply chain policy of the organization, supply chain enabling information technology, training and development program for the supply chain staffs, and socioeconomic factors) are explain dependent variable (supply chain efficiency) by 85.90% which evaluates the model.

Finally, the hypotheses developed in this study were tested and the result shows that all supply chain dimensions have significant and positive impact on supply chain efficiency.

Among the seven significantly strong relationships of the independent variables' on aggregate dependent variable (supply chain efficiency), the study revealed that socioeconomic factor, supply chain policy of the organization, information technology of the organization and training and development program have scored R square of 86.70%, 85.90%, 83.50% and 72.83% respectively. As the value of R squared shows, the dependent variable (supply chain efficiency) is explained (impacted) by all independent variables, but the above four individual member variables have significant relationship with the dependent variable (supply chain efficiency), which show the strongest relationship between the dependent and independent variables. Furthermore, the model fitness too is confirmed as presented in all ANOVA table.

5.2. Conclusion

This research was conducted in an attempt to determine the supply chain efficiency of International Rescue Committee – Ethiopia Program. The research was done by putting major factors affecting supply chain efficiency in one dimension and supply chain efficiency in the other. By making particular emphasis to the measurement of the level of major factors affecting supply chain efficiency and supply chain efficiency with predicted association and impact relationship between the two. The following conclusions have been drawn on the bases of the findings of the data analysis endeavor.

- The longer lead time has been affecting SC efficiency negatively.
- The prevailing intermittent internet has been negatively affecting SC efficiency.
- There is no offline SC enabling software; hence, if internet or electricity downs the overall SC work will be interrupted.
- Lacks of training and development for SC staffs have been negatively affecting SC efficiency.
- The organization is not benefiting from frame work agreement with potential suppliers for all categories for all outlet offices.

The composite mean scores of the scales of the independent variable, i.e. lead time of materials to be procured, supply chain policy maintaining, supply chain enabling information technology, training and development program of the organization, socio economic factors revealed that the respondents perceive that International Rescue Committee exerted relatively lower efforts with respect to the above parameters; this is manifested by non meeting of lead times for emergency responses, the repeatedly changing of standard operating procedures for supply chain, steady information technology system and non availability of training and development program for the department. With respect to the socioeconomic factor the lowest mean reveal that IRC did not established long term contract for most items in most regional offices. The composite mean scores of the scales of the independent variable, lead time of materials to be procured, supply chain enabling technology, supply chain staffs training and development and supply chain policy, revealed that the respondents perceive that International Rescue Committee exerted relatively lower efforts in minimizing lead time for materials, whereas their perceived evaluation

of the supply chain enabling information technology as expressed by the composite mean values, suggested that only moderately function for swift responses to different emergencies. In the same manner composite mean score for supply chain policy and standard operating procedures and supply chain management guides have been disseminated by the global supply chain management team is somewhat creating bottleneck for supply chain efficiency due to it is changing repeatedly and without the required internalizing training about the changed guidelines. Generally, the overall survey findings of this particular study revealed that the supply chain management of International rescue Committee – Ethiopia Program in relation to supply chain efficiency is poor as the perceived appraisal of the participants indicated.

The study revealed that socioeconomic factor, supply chain policy of the organization, information technology of the organization and training and development program have scored R square of 86.70%, 85.90%, 83.50% and 72.83% respectively. As the value of R squared shows, the dependent variable (supply chain efficiency) is explained (impacted) by all independent variables, but the above four individual member variables have significant relationship with the dependent variable (supply chain efficiency), which show the strongest relationship between the dependent and independent variables. Furthermore, the model fitness too is confirmed as presented in all ANOVA table.

5.3. Recommendations

International Rescue Committee –Ethiopia Program should review the exiting over all supply chain management and construct the necessary modifications with respect to swift delivery time of materials to be procured, maintain a good and durable supply chain guideline and standard operating procedures, and the organization shall be required to establish offline software that work parallel with the new BVA system, which is part of an ERP for the firm. Here, some suggestions are forwarded on the basis of the findings of the study.

- IRC Ethiopia Program should design dynamic supply chain processes that should go in line with the overall strategic plan.
- Supply chain enabler software or the Budget vis-à-vis Actual (BVA) - software should be swift, consistent, user friendly and should work offline to speed up the emergency response activities throughout the country. The use of other alternatives like satellite networks for emergency supply chain functions is recommended.
- The existing supply chain policies should consider the prevailing market situation of Ethiopia, to this effect, the lead times and standard operating procedures should be examined by all stakeholders and established.
- IRC Ethiopia Program should avail training and development program for the supply chain department. So the staffs go in line with the dynamic environment and the ever-changing guideline.
- IRC Ethiopia Program should implement long term contract with potential suppliers or service providers not only in Addis but also in out let offices.
- IRC should develop procurement objects catalogue for standardization & specification to eliminate ambiguity.
- The organization should prepare workshop to its suppliers, so that it will communicate demands, programs and related phenomenon.
- IRC SC should scan its immediate market environment within intervals.
- SC should design internal customer satisfaction procedures i.e through exhaustive master purchase agreement, reducing lead time for procurement objects, and training for non SC staffs.

As revealed by the findings of the study, the level of supply chain efficiency in the IRC is overall rated as performing moderately. The apparent moderate function of supply chain with major factors affecting it witnessed as having significant positive relationship, this in turn imply that International rescue Committee has to work on essential supply chain management designs in order to enhance the department's efficiency.

Socio-economic factors of supply chain capture all actions involving continuous environmental scanning and reviewing of organisational strategies, objectives, and supply chain policies in order to ensure that the right quality and quantity of supplies and services are available when and where they are needed.

The integration of supply chain management and organizational emergency response programs will enable IRC to maximize its performance and privilege through creating organisational value, by recognizing supply chain staffs are a source of competitive advantage and drawing attention to ways in which staffs could be trained, developed and deployed more appropriately, in turn enhancing the efficiency of supply chain management and achievement of organizational goals. Effective supply chain staffs training and development shall be a critical part of the organization's strategy and it should be imperative that it is well understood and implemented in the IRC – Ethiopia Program.

5.3.1. Limitation and suggestions for future studies

Like many research works, this particular study is also subjected to some limitations. First and for most, this study does not comprehensively capture all aspects of supply chain practices as applicable to factors affecting supply chain efficiency, rather it made emphasis in revealing the associations and impact relationships that seven major supply chain dimensions have with supply chain efficiency of International Rescue Committee. In order to benefit from a comprehensive assessment of the factors that truly affect the humanitarian supply chain performance, future studies shall consider more dimensions of factors affecting supply chain and supply chain efficiency relationship that haven't been considered in this particular study.

The other most important limitation of the study is the fact that though the unit of analysis was the overall supply chain function, the study was purely conducted on the basis of the responses obtained from International rescue Committee – Ethiopia Program supply chain performers throughout the country, since it assumed the buying firms' perspective. To have a holistic insight, future researches need to have more fully examined the nature of the exchange relationship from the suppliers' and other stakeholders' perspective.

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Appendix A: Research Questionnaire

A research for partial fulfillment of MA in logistics and supply chain management at Addis Ababa University School of Commerce on Factors affecting humanitarian supply chain efficiency - the case of International Rescue Committee (IRC) - Ethiopia

Dear participant,

The purpose of this survey is to gather data for an academic study of MA in logistics and supply chain management at Addis Ababa University School of Commerce. As part of the partial fulfillment of dissertation I am examining factors affecting humanitarian supply chain efficiency in IRC Ethiopia.

I kindly request you to participate in this research study by completing this questionnaire. All the information you are going to provide will be treated carefully and confidentially. Please do not write your name on any part of the question response paper.

I also kindly request you to answer all the questions as honestly as possible and return the completed questionnaire in time. Your feedback will provide valuable information regarding the factors affecting supply chain efficiency in the International Rescue Committee – Ethiopia Program. The study will certainly benefit all stakeholders in the organization.

I know that you are very busy and your time is very valuable but filling the questionnaire will not take more than 15 minutes to complete. Please attempt to answer all questions and make a tick mark (✓) on only one box that best explains your opinion for each statement.

If you have any questions, please contact me by my email address yosef.negero@rescue.org or cell phone - 0911850223.

I thank you very much in advance for your precious time.

Thank you and Regards,

Yosef Negero

Notes:

- You do not need to write your name.
- Answer your preference by ticking (✓) mark in the check box.
- Please respond as precisely as possible and at your earliest convenience.

Part I: Participants' back ground information

Instruction: This section discuss about the background information of the participants in order to have a clear biography. Please check in the box that you think is most representing.

1. Gender: Male ☐ Female ☐

2. Age Group

20 - 30 ☐ 31- 40 ☐ 41-50 ☐ Above 50 ☐

3. Educational qualification

Diploma ☐ First degree (BSc, BA) ☐ Master's degree (MSc, MA) ☐

Other: Please specify _____

4. Level of your position?

Assistant (G 3) ☐ Officer (G4) ☐ Manager (G5) ☐ Coordinator (G6 & 7) ☐

5. Total work experience in IRC's supply chain?

≤1 year ☐ > 1 but ≤ 3 Years ☐ > 3 but ≤ 5 Years ☐ > 5 but ≤ 7years ☐

> 7 but ≤ 10 Years ☐ > 10 Years ☐

6. Field offices

Shire ☐ Jijiga ☐ Melkadida ☐ Assosa ☐ Hawassa ☐

Gambella ☐ Adama ☐ Addis Ababa ☐

Part II: Questions to assess supply chain factors on operational efficiency

Please carefully read the listed points and indicate your choices by putting the tick mark (✓) on the appropriate cell that best describes your opinion. **Where; 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree.** Please indicate the degree to which you agree with the following respective factors application in practices of supply chain management in IRC.

Factors affecting supply chain efficiency in IRC						
No.	Item Description	Degrees of application				
		Strongly disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly agree (5)
I.	Supply Chain Factors					
	A. Longer lead-time					
1	SC department is successful in assuring on-time delivery of most ordered materials					
2	Estimated lead time of IRC's procurement chart for most levels are achievable					
3	Users consider both internal (Country office→FO→RC) and external transit times for delivery requirements					
4	Most suppliers and service providers meet an offered lead time					
5	Internal customers are satisfied with the achievements of IRC's SC function					
	B. Information Technology					
1	IRC have well designed supply chain process enabler information technology					

	system					
2	IRC office and refugee camps have consistent connectivity of electronic data interchange system					
3	IRC have stable connectivity to use BVA system					
4	There is a need for BVA system to work offline					
5	Budget vs actual system (BVA) system is user friendly					
6	There is a need for a new Enterprise Resource Planning (ERP) system with user centered design					
	C. Supply Chain Policy, SOPs, guidelines, manuals					
1	IRC has well established and workable supply chain policies, standard operating procedures and manuals					
2	Purchase requests are filled properly by requesters					
3	Standard operating procedures (SOPs) are changing from time to time within short period					
4	The procurement processes are highly bureaucratic					
5	Segregation of duty in IRC is well exercised					
	D. Supply Chain training & Development					
1	I have got the necessary Budget vs Actual (BVA) electronic data interchange system training					
2	Supply chain have adequate number of staff with required competencies					

3	IRC has conducive environment to learn and knowledge sharing					
4	Supply chain staffs attend training and development workshops continuously					
5	IRC has access to necessary supply chain online courses with certification					
6	Self-learning is well appreciated and supported by required resources					
	E. Socio-economic factor					
1	IRC has a list of long term contract with suppliers for most categories of supplies and/or services					
2	Most vendors have know-how and technical capability of their goods and/or services					
3	Requests made by IRC easily understood by suppliers					
4	IRC faces competition for supply from other INGOs					
5	IRC needs local languages translation system to bid documents					
6	Most goods and services required are available in local markets					
7	Markets in IRC response areas are unstable and inherent with inflations					
8	Most program staffs purchase requisitions are not clear and not with full specifications					
	F. Institutional Donors					
1	IRC's donors accept all policies, SOPs and manuals of IRC are the same					
2	Donor regulation create bottleneck in the processes of supply chain					

3	Donors funding are flexible for supply chain functions					
4	Most institutional donors allot fund for supply chain infrastructures and long term disaster response					
	G. Socio-political					
1	Political instability has an impact on lead time of materials delivery to the country program					
2	There is a flexibility with respect to local governments to allow staffs from other places					
3	IRC affected by new government policies and procedures					
4	70/30 allocation of expenses has an effect on supply chain efficiency					
5	Availability of fear of security threat and vulnerability of staffs working in remote locations					
6	IRC has got proper assistance to operational requests from local administrative body.					
II.	Supply Chain Efficiency					
1	IRC's SC has reduced costs of inputs used in delivering all supplies and services to end user significantly					
2	IRC's supply chain most of the time attain value for money for materials and items purchased					
3	IRC train, develop and empower SC staffs with in fixed time intervals uninterruptedly					
4	IRC have stable connectivity to use the newly implemented online BVA system					
5	Supply chain always meet lead time for all materials requested by programs					
6	Supply chain meets internal and external customers satisfactorily					
7	Local markets fulfill all IRC's need, &					

Appendix B: Interview

Addis Ababa University

School of Commerce

Department of Logistics and Supply Chain Management

Dear Supply Chain operations department head/Coordinator,

Whilst I fully appreciate how busy you must be, I will pose short interview questions of what are, hopefully straightforward questions which I trust that you will be able to find the time to answer. This interview is for an academic purpose - for a partial fulfillment of master's degree on logistics and supply chain management. The study is on Factors affecting humanitarian supply chain efficiency - the case of International Rescue Committee (IRC) - Ethiopia. The nature of this interview is of open and closed ended. My aim at present is to establish some preliminary data; once I have analysed this data my intention will be to conduct more in-depth research into the trends and issues raised. Ultimately, my aim is to make a lasting contribution to knowledge within what is a vital area for the humanitarian relief supply chain and, to that end, I will be happy for you to review my findings as and when they become available.

Please feel free to ask when you need further clarifications and answer only what you know and comfortable with. The interview will not take more than thirty minutes.

With many thanks in anticipation.

Yours faithfully,

1. Please briefly introduce yourself and how long you have been working in the organization and specifically in your current position?

2. How well are cost efficiency (value for money), reliability of supply chain (tasks are conducted as expected) functions and effectiveness (within expected time) are met?
3. Do you have stable information communication technology for SC functions? And what is the backup software system when internet data are off?
4. How do you explain the existing delivery date accuracy of the lead time on the country program SC chart is met?
5. Are there formal and/or informal complaints presented to you on the supply chain function operations from programs? If so, which are the major ones?
6. Do you have formal training and development for programs? If so, what are the methods you use to formally train and develop staffs whose efforts, commitments and achievements are on their peak?
7. How do you evaluate the influence of standard operating procedures (SOPs) repeated changes on supply chain efficiency?
8. What were the difficulties and barriers for humanitarian supply chain efficiency in IRC - Ethiopia?
9. How could humanitarian supply chain efficiency be mitigated or improved in the organization?
10. Anything you want to add?

Appendix C

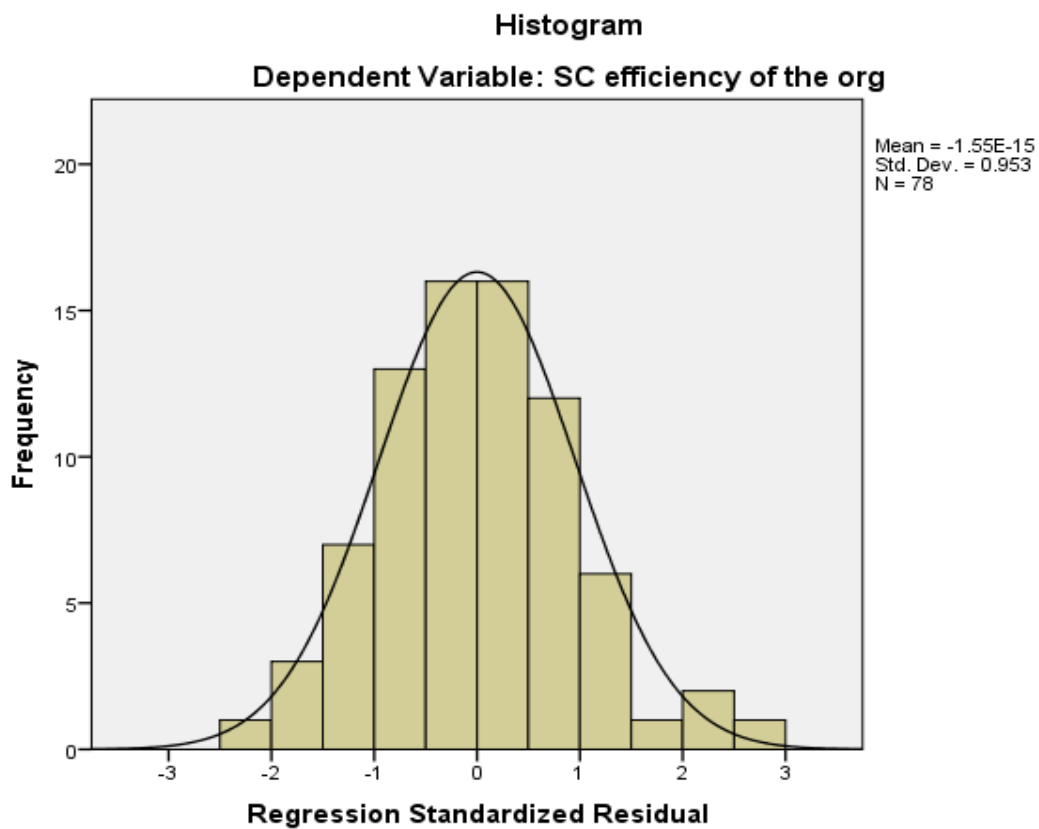
Variables Entered/Removed^a

Model	Variables Entered	Variables Removed	Method
1	Socio political factors, Training and development program, IRC SC policy , Institutional donors factors, Lead Time of materials, Socioeconomic factors, Information Communication technology ^b		Enter

a. Dependent Variable: SC efficiency of the org

b. All requested variables entered.

Normality Assumption Test



Appendix D

Homoscedasticity Assumption Test

Scatter Plot

Normal P-P Plot of Regression Standardized Residual

Dependent Variable: SC efficiency of the org

