CHALLENGES OF SUPPLY CHAIN MANAGEMENT PRACTICESIN PRIVATE ROAD CONSTRUCTION FIRMS IN ETHIOPIA

A THESIS SUBMITTED TO DEPARTMENT OF MANAGEMENT FOR THE PARTIAL FULFILMENT OF THE REQUIREMENTS OF DEGREE OF MASTERS OF BUSINESS ADINISTRATION

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DECLARATION

I, the undersigned, declare that this thesis is my original work, prepared under the guidance of Dr.Shiferaw Mitiku and Tagay Firde. All sources of materials used for the thesis have been accordingly acknowledged. I further confirm that the thesis has not been submitted to any extra higher learning institution for the purpose of earning any degree.

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ENDORSEMENT

This thesis has been submitted to Wolkite University, college of Business and Economics for examination with my approval as a university advisor.

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Wolkite University, Wolkite Ethiopia January, 2018

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Abstract

- *The road construction sector plays a key role in the developmental agenda of a nation by providing transportation services to the various sectors of the economy. Supply chain management has become a fundamental element in the construction industry to improve the efficiency and productivity in recent decades. However, the road sector has encountered series of problems in its quest to deliver road infrastructure and projects have been unduly delayed as a result of poor management of the supply chain system in the sector. In this light, this study was intended to explore challenges of supply chain management in road construction in order to enhance project delivery performance and the study was guided by seven objectives. Which were to examine internal operation, to determine the approaches in information sharing practice, to explore the existing information technology usage, to evaluate the training practice, to examine the extent of supply chain integration, to assess the impact of supply chain management practices and to identify the challenges of supply chain management of Ethiopian private domestic road construction companies. For achieving the objective of this study, 62 questionnaires were distributed and 51 of them were successfully completed and analyzed using descriptive and inferential methods. Only primary source of data were used for this Study and both quantitative and qualitative approaches were adopted in its conduct by using survey questionnaire and interview as the main data collection instrument. The statistical package for social science was used to package the raw data which paved the way for statistical analysis using tools such as correlation, multiple regression and descriptive statistics comprising of mean and standard deviation. The questionnaire was rated using five points liker Scale. The major findings indicate that, most of supply chain management practices are moderately practiced with in the Ethiopian road construction companies supply chain, whereas supply chain integration and training Practices are poorly applied. Unplanned orders financial Impact, Subsequent design change, inventory fluctuation and employee ineffectiveness are major challenges of the companies supply chain. The Study helps to create awareness to studied companies owners, and it will give chance for others who are interested on supply chain practice and challenges to make further studies.*

KEY WORDS: Integration, Supply chain and Supply chain management

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Contents page

ACKNOWLEDGEMENT iii
Abstract iv
ACRONOMYS viii
LIST OF TABLES ix
LIST OF FIGURES x
CHAPTER ONE 1
1. Introduction 1
1.1. Background of the study 1
1.3. Research Questions 4
1.4. Objectives 4
1.4.1. General objective 4
1.4.2. Specific Objective 4
1.5. Definition of Terms / Concepts /constructs 5
1.6. Significance of the Study 5
1.7. Scope of the Study 5
1.8. Limitations of the Study 6
1.9. Organization of the Study 6
CHAPTER TWO 7
2. Related Literature Review 7
2.1. Introduction 7
2.2. Theoretical Review of Supply Chain Management 7
2.3. Supply Chain Management Practice (SCMP) 10
2.4. Elements of SCM 11
2.4.1. Internal Operation 11
2.4.2. Information Sharing 12
2.4.3. Information Technology (IT) 12
2.4.4. Training 13
2.4.5. Supply Chain Integration 13
2.5. Challenges of Supply Chain management 14
2.6. Customer Focus 15

WKULISDL

2.7. Identified Gaps 15
2.8. Conceptual framework 15
CHAPTER THREE 17
3. Research design and method of the study 17
3.1. Introduction 17
3.2. Research design and approach 17
3.3. Target Population 17
3.4. Population and sampling techniques 17
3.4.1. Sample size 17
3.4.2. Types of data and data collection instruments 17
3.4.3. Primary data collection 17
3.5. Procedures of data collection 18
3.6. Methods of data analysis 18
3.6.1. Reasons to Select the Model 18
3.7. Validity & Reliability of questionnaire 19
3.7.1. Validity Test 19
3.7.2. Reliability Test 20
CHAPTER FOUR: 22
4. Data analysis, interpretation and discussions 22
4.1. Introduction 22
4.1. Analysis of the Respondents' Profile 22
4.1.1. Education qualification of respondents 22
4.1.2. Respondents work experience in the company 24
4.1.3. Respondents work experience in current position 25
4.2. Descriptive Statistical Analysis of SCM Practices 25
4.3. Correlation and Regression Analysis 34
4.3.1. Correlation Analysis 34
4.3.2. Regression Result 35
4.3.2.1. Assumptions of regression 35
4.4. Challenges of Supply Chain Management 38
CHAPTER FIVE: 42
5. Summary of findings, Conclusions and Recommendations 42

WKULISDL

5.1. Introduction 42
5.2. Summary of major Findings 42
5.3. Conclusions 43
5.4. Recommendation 45
5.5. Suggestions for further study 45
Reference 47
Appendices-A-Questionnaire 50
Appendix- B:-Interview Question 53
Appendix-C: List of studied companies 54

WKULISDL

ACRONOMYS

GC	General Contractor
ERA	Ethiopian Road Authority
P	Performance
SC	Supply chain
SCR	Suppliers and contractor Relationship
IOP	Internal Operation Practice
IS	Information Sharing
IP	Information technology and
TP	Training Practices
SCI	Supply chain integration
ANOVA	Analysis of variance
i.e.	id est (Latin stand for 'that is')

WKULISDL

LIST OF TABLES

Table 2:1Conceptual explanation of SCM ……..……8
Table 3.1 Reliability Statistics…….……..21
Table 4.1 Response Rate .....…..... 22
Table 4.2 Education qualification……..…23
Table 4.3 Respondents work experience in the company……..…24
Table 4.4 Distribution of Respondents by length of service…….....25
Table 4.5 Internal Operation Practice of SCM ……..…..….. 26
Table 4.6 Information Sharing Practice of SCM……...…28
Table 4.7 Information Technology Practices of SCM……...…29
Table 4.8 Training Practice of SCM……...…30
Table 4.9 Company Integration with projects and client……..…32
Table 4.10 Supply Chain Integration with suppliers…….…....33
Table 4.11 Correlation matrix……34
Table 4.12:- Coefficients estimates…….…..….36
Table 4.13:- Regression Model summary ……..……37
Table 4.14:- ANOVA…….37
Table 4.15:- Challenges of SCM…….……..38
Table 4.16:- Level of Risks in Challenges of SCM…….……40

WKULISDL

LIST OF FIGURES

Figure 1.1.1-Frequency of Education qualification

Figure 1.1-Respondents work experience in the company

Figure 4.3- Frequency of respondents work experience in current position

WKULISDL

CHAPTER ONE

1. Introduction

This research is targeted on challenges of supply chain management practice and specifically this chapter introduces the background of the study, problem statement, research questions, objectives of the study, scope of the study, significance, and organization of the study and operational definition of the study.

1.1. Background of the study

Now a day's business environment is in a persistent state of change. Changing customer tendency, product assortments and geographies are in continuous evolution and orienting the way business is conducted. The supply chain has been defined 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 hands of the ultimate customer (R. V. a. L. Koskela, 2000). Supply chain management is abruptly growing management that affects the whole group in business media. Only organizations which have skillful, organized and optimized business practice can meet the requirements of the market and fit the competition.

Construction is a project based industry with a highly complex, fragmented and uncertain operating environment .Characteristics which set it apart from manufacturing are onsite production, one of a kind products delivered through a web of highly complex and complicated activities (L. Koskela, 1992).Continuous development and maintenance of essential public infrastructure is an important ingredient for sustained economic growth. At a national level, transportation investment increases productivity and built economic potential. It contributes by making freight flows more efficient and reliable whilst doing the same for personal and business travel increasing also mobility and quality of life. Modern infrastructure networks create more productivity amongst businesses and individuals across the geographic landscape.

Currently the Ethiopian business environment is becoming customer driven, competitive and technology based, hence, it is unquestionable that companies should build an integrated and efficient system through which resources would flow in a across the supply chain. The current practices of Ethiopian construction industries regard to supply chain management is traditional in that, partners involved across the supply chain act independently in designing, developing and

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executing strategies with minimum effort made to align strategies with the partners doing business with them particularly suppliers and distributors. (Bernard, 2006)suggests that the relationship with suppliers and other partners should be supported with an appropriate level of information technology and information system. Therefore the investigator has, thus been inspired to conduct a study on the practice and challenges of supply chain management in selected Construction Company and forward possible suggestion that would enable the company to be competitive.

1.2. Statement of the Problem

The construction industry plays a significant role in economic growth, both directly through its activities, and indirectly through the provision of infrastructures for the smooth functioning of businesses. However, the construction industry is provoked with a number of challenges. According to (R. V. a. L. Koskela, 2000),construction supply chains remain problematic. The principal reason for the problem in construction supply chain is due to the myopic controls focusing on effects rather than causes(H. V. a. R. Vrijhoef, 2016). This problem is deepened further by the fragmented character of construction and its confrontational procurement, contracting and tendering environment. Construction supply chains (CSC) can be very complex particularly in large projects due to variety of site materials and parties (suppliers and customers) required for a construction project(Al-Werikat, 2017). Lack of locally available materials, that compels import from overseas, seems to be at the core of shortage of materials. On the other hand, inability to timely procure and maintain a suitable inventory is the most important cause of delay in materials supply. This is due to the late identification of what materials to be required, which in turn originates from change orders and very late changes in decisions(M M Rahman, 2017).According to (Georgios A. Papadopoulos, 2016)even though SCM in the manufacturing industry has been widely researched and developed, the application of these same principles to the construction industry shows waste and problems. The study of (Vikram Kulkarni, 2017)indicates that, there is no any material management department in small & medium construction firms. Even though large construction firms are using different material management techniques like software, still they are facing problems which in turn results in delay in work, project cost overruns, decrease in labor productivity and wastage of materials.

As the intensive construction in Ethiopia becomes more complex, the demand for road and project management services is increasing. During the road construction the application of project management the progress against time, cost against tender or budget, quality against specifications is can be confusing for all parties involved in the construction process. Road constructions is expected to be completed on time and within estimated budget and open for traffic, but all of the road projects are always faced to time overrun and over budget. Financial problems, improper planning, land acquisition and construction delay, design changes, less materials and equipment supply by contractors, incomplete design are the main sources of delay and cost overrun respectively(Patel, 2018).The academic study conducted in Ethiopia on 24

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projects by (Nega, 2008)Shows that 80% of the projects are experiencing the cost overrun. According to the desk study reports conducted by(Patel, 2018), on 10 completed road projects in Addis Ababa, all of them had experienced time and cost overrun. Thus, they take more time and cost than what had been estimated. The rates are ranging from a minimum of 25% to the maximum of 264.38% time and a minimum of 4.11% to the maximum of 135.06% of cost. The percentage rate of cost overrun among projects extended from 4.16% to 83.2%. While the average percentage of cost overrun was nearly 21.52%, this costs the owner around 462.6 million of ETB – which is a significant amount when compared with the number of projects due to the reasons of variations. that happen throughout implementation, the problem of right of way inadequate and delay of resources and material price escalation(Ashebir Shiferaw Belachew, 2017).(Tadesse AYALEW, 2016)also identified that time, cost and risk management as the most challenging issues for professionals in managing their day to day's activities. The amount of schedule slippage ranges between 61-80% and that of planed costs and other variables such as risk, quality, resources utilization and safety deviates in the range of 21-40% from predetermined requirements, planned or anticipated at the beginning.

The Ethiopian road construction firm's orientation towards SCM is traditional and poor that lacks substantial indicators of an integrated, efficient and effective SCM. And they also have great problem on training and IT practice(DIBABA, 2015). Even though a number of studies have been conducted on challenges of road construction supply chain management practice, there is no known study featuring supply chain management in road construction projects among developing countries, particularly in Ethiopia. This study therefore seeks to bridge this gap by examining the challenges of supply chain management practice in Ethiopian road construction firms.

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1.3. Research Questions

In order to address the main objectives of the study, the researcher has raised the following questions.

I. To identify internal operation practiced of Ethiopian private road construction companies
II. What are the approaches of information sharing practice in Ethiopian private road construction companies
III. To what extent does information technology is practiced in Ethiopian private road construction companies
IV. Is employee training well-practiced in Ethiopian private road construction companies
V. To what extent does SC integration is practiced among private road construction companies SC partners;
VI. What are the impacts of supply chain management practice in domestic private road construction firms in Ethiopia?.
VII. What are the main challenges of SCM in domestic private road construction Companies in Ethiopia?

1.4. Objectives

1.4.1. General objective

The primary objective of this study is to identify Challenges of supply chain management in road construction firms in comparison with supply chain practice.

1.4.2. Specific Objective

- To examine internal operation practice of Ethiopian private road construction companies
- To investigate the approaches in information sharing practice of Ethiopian private road construction companies
- To explore the existing information technology usage of Ethiopian private road construction companies
- To evaluate the training practice of Ethiopian private road construction companies
- To examine the extent of SC integration among of Ethiopian private road construction companies
- To assess the impact of current practice of Ethiopian private road construction companies on supply chain management performance;
- To identify the challenges of SCM for Ethiopian private domestic road construction companies.

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1.5. Definition of Terms / Concepts /constructs

Definition of terms comprises of conceptual and operational definitions.

Supply chain:- refer to those activities associated with the transformation and flow of goods and service, including their attendant information flows, from source of raw materials to end users (Nichols, 1999).

Supply chain management:- is the systematic, strategic coordination of the traditional business functions and the tactics across these business functions within a particular company and across business within the supply chain(JohT.Metezer, 2004)

Integration:-Close alignment and coordination with in supply chin ,often with the use of shared management information systems (Nichols, 1999).

1.6. Significance of the Study

This study is important because it supports the government and other stake holders to establish rules and guide lines to enhance proper supply chain management in road construction which increases the competition of construction firms. In addition it increases the market system efficiency which had an impact on modernizing businesses. The study also help students and other scholars to gain knowledge in terms of information that was attained during this study .The study is an enhancement to the academic body of knowledge for researchers, while to other scholars, it be a source of reference material on the subject, useful for further study. Finally, beneficiaries from the study will be the business people in the construction industry, they use the findings to know how to enhance their work and deal with the common challenges systematically.

1.7. Scope of the Study

Supply chain management (SCM) enables to see the members of the supply chain (SC) as an integrated whole and elicit synergy impact. An effective and efficient supply chain management enables to have minimized cost, reduced lead time, flexible operation, systematic integration and ultimately customer satisfaction. SCM encompasses vast area of managerial practice; however, it is difficult and unmanageable to conduct the study in all area that summarizes SCM in terms of time, finance, and research manageability.

Therefore, the scope of this study is restricted to specific context which is challenges of SCM in private grade one up to grade four road construction firms in Ethiopia only. This study is specifically focused on internal operation, information sharing, information technology, training SC integration and challenges of SCM.

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1.8. Limitations of the Study

The researcher had an uphill task to convince the respondents to participate in the study. Most of the respondents were Senior Managers who are busy and had no time to respond to the questionnaires. The findings of this study and application therefore are limited to Ethiopian grade one to grade four road firms. It is therefore important to note that the findings of this study can only be used for comparative purposes.

1.9. **Organization of the Study**

This study comprises of five interrelated chapters. Chapter one deals with the general introduction of the study comprising of the background, problem statement, research questions, aim and objectives among others whereas chapter two is concentrated on review of related literatures while chapter three deals with the methodology adopted for the study. On the other hand the analysis of field data collected was discussed in the fourth chapter while the final chapter is focused on the conclusion and recommendations of the study.

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CHAPTER TWO

2. Related Literature Review

2.1. Introduction

This chapter discusses related literatures in the area of road construction supply chain management. Among the issues discussed, include overview of supply chain management, implementation of supply chain management, supply chain management practices, challenges of supply chain management implementation.

2.2. Theoretical Review of Supply Chain Management

Before supply chain was created, the term used for management and exchange of product and services was logistics. The development was undertaken by the military in ancient times (Deres, 2011). The concept of SCM was driven from Logistics. The term SCM was introduced by consultants in the early 1980s (Martha C.Cooper, 1997).(kwasi, November 2014)used the term SCM as a network of facilitating that produce raw5r4 materials, transform them into goods and finally deliver the goods to customers through a distribution system. Oliver used the term to develop a vision for slashing down functional silos that separated production, marketing, and distribution. This concept was inflamed upon efficient and effective mutual benefits associated with information sharing and decision coordinating to up and down a supply chain (Deres, 2011).A supply chain is connected organizations and activities involved in creating and making product. If any one looks in the reverse direction at the same activities, then the concept supply chain becomes can be a demand chain.(Akintoye, 2002; Mentzer)define Supply chain as linkage of three or more organizations for the purpose of one or more flows of products, services, finances and information from a source to a customer. In this context of study, SCM involves managing complex flow of information, materials and money across multiple areas both within and among organizations to achieve goals related system performance. In the current business environment, organizations should not fight entirely as individuals. One organization must rely on other organizations in their supply chains to build competency in the global market pool.

According to (Tan, 2001)there is no much uniformity in the use of exact meaning. Tan also argues that although there are some common ideas about what SCM is, there is no common universally accepted meaning of SCM. Absence of universally acceptable definition of SCM may have negative impact on SCM studies. However, this study adopts the wider meaning of SCM which includes all aspects encompassed in most studies. Numerous disciplines have contributed enormously to the evolution of SCM; key among them are purchasing and supply, logistics and transportation, marketing, organizational behavior, network, strategic management, management information systems and operations management(Injazz Chen, 2004).(A. Gunasekarana, 2004)argued that the scope of SCM is beyond material management, partnership and IT by incorporating aggregate quality management areas predominantly management

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commitment, organizational structure, training and behavioral issues. Some of the definitions of supply chain management mentioned by (Rajenddra Kumarr Shukla, 2011) provided in Table 2.1 below.

Table2:1Conceptual explanation of SCM

Authors	**Definition of SCM**	**Key ideas**
Scott and Brook, (1991)	The chain linking each element of the manufacturing and supply process from raw materials to the end user, encompassing several organizational boundaries	Highlights the significance of coordination among constituent members.
Ellaram, (1991)	The integration of the processes, systems, and organizations that control the movement of goods from the supplier to a satisfied customer without waste.	Highlights the necessity of integration among the organizations, physical movement and the waste reduction principal of JIT
Lee and Billington, (1992)	Networks of manufacturing and distribution sites that procure raw materials, transform them into intermediate and finished products, and distribute them to customers.	Attempts to show conventional functions of supply chain
Ellrarn and Cooper, (1993)	The management of upstream and downstream relationships with suppliers and customers to deliver superior customer value at less cost to the supply chain as a whole.	Signifies the importance of relationships, customer focus and cost reduction.
Ellrarn and Cooper, (1993)	An integrating philosophy to manage the total flow of a distribution channel from supplier to ultimate customer.	Identifies the importance of integration within supply chain.
Berry *et al.* (1994)	SCM aims at building trust, exchanging information on market needs, developing new products, and reducing the supplier base to particular original equipment manufacturer so as to release management resources for developing meaningful, long term relationship.	Highlights the importance of supplier relationships in achieving supply chain objectives.
Cox *et al.*(1995)	The functions within and outside a company that enable value chain to make and provide products to the customer.	Attempts to identify strategic partners within supply chain
Saunders, (1997)	Supply Chain is the total chain of exchange from original source of raw material, through various firms involved in extracting and processing raw materials, manufacturing, assembling, distributing, and retailing to end customers.	Network of firms interacting to deliver product or service to the end customer, linking flows from raw material supply to final delivery.
Patricia *et al.* (1996)	The physical network that begins with the supplier and ends with the customer.	Traces all the organizations with within a supply chain including all tiers of suppliers and distribution.
Monczka	Integrated SCM is about going from the external	Highlights the necessity of flat

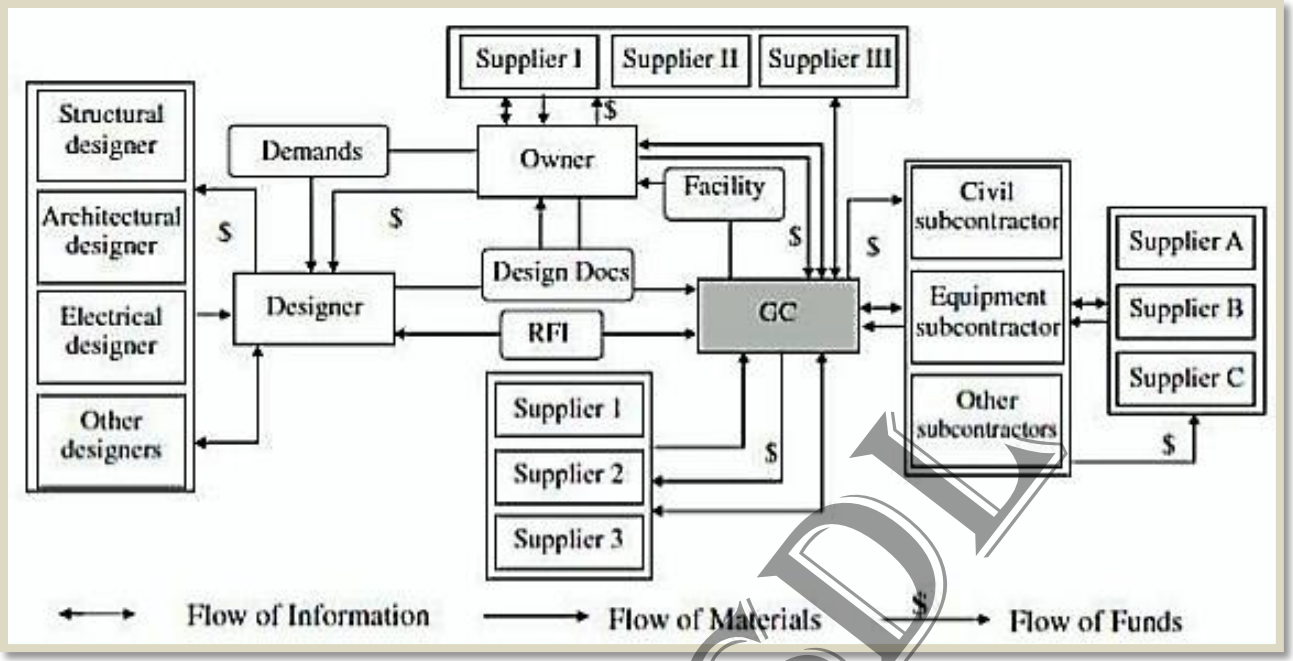
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and Morgan(1997)	customer and then managing all the processes that are needed to provide the customer with value in a horizontal way.	organizational structure and customer focus.
Tan *et al.* (1998)	It is management philosophy that extends traditional intra-enterprise activities by bringing trading partners together with the common goal of optimization and efficiency.	Focuses on how firms utilize their suppliers' processes, technology and capability to enhance competitive advantage
HoulihanandHoulihan, (1999)	The integration of various functional areas within an organization to enhance the flow of goods from immediate strategic suppliers through manufacturing and distribution chain to the end user.	Considers strategically important suppliers and integration among constituent members

Source: (Rajenddra Kumarr Shukla, 2011)

The application of SCM concepts to construction sector require the SC managers to break the traditional SCM shells of manufacturing industry and make the supply chain project-centric rather than organization-centric. Even if performance of construction industry with regards to the quality , cost and time of delivery are as well-developed as the other industries, it is believed that there is still gap for the enhancements of SCM instruments for the Construction Industry. Since contractors, suppliers, customers, consultants, Bank, Insurance, permitting agency and public are very significant element of SCM, teamwork among those sectors play essential role(Akintoye, 2002).Contractors have significant role to launch and develop the SCM which includes the activities and tasks leading to preparation of the production on site involving clients and design staffs (Gadde, 2000). Both upstream and downstream Sustainable cash flow and data flow are provided by contractors. (H. V. a. R. Vrijhoef, 2016) pointed out that SCM in construction industry is different from the other industries with that in case of construction industry; clients are involved in the chain both at the start and at the end. CSC a multi-stage process like conceptual development, design, construction, maintenance and replacement and it is also a multi-organization process, which involves owner, contractor supplier, consultant etc. From this point of view, Construction Supply Chain (CSC) is all the construction process, from the demands by the client, conceptual, design, construction and maintenance and organizations, which are involved in the construction process, such as owner, designer, general contractors, subcontractors, suppliers, consultants.

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Source:-Vrijhoef and Ridder (2007)

Figure 2.1 General Structure of Construction Supply Chain

2.3. Supply Chain Management Practice (SCMP)

SCM is set of actions performed in an organization to enhance effective management of their SC. Many Product supplier and service provider companies striving to build their potential of the major cost reduction and service improvements offered by applying best practices in their supply chain. Purchasing and supply management was the source for the concept of SCM. According to(Pires, 2006)SCM is similar with the integration of the supply base that developed from the traditional purchasing and materials functions. Others who define SCM from the Purchasing viewpoint include (Martha C.Cooper, 1997; Tan, 2001)stated that SCM is specialized supporting function instead it is a basic strategic business process. From the transportation and logistics management perspective, SCM is synonymous with integrated logistics systems' and concentrates on inventory and waste reduction(John T. Mentzer, 2001).

Different literatures show many dimensions of perspectives of SCM practices(Kabossa A.B. Msimangira, 2003). These many writers perspectives suggested a multi-dimensionality of SCM that covers set of activities and processes from upstream, firm's internal operations to downstream of the supply chain. SCM is now considered as critical business process for manufacturing or service provider companies. This is because customers' demand for different products and services are more demanding in timely availability, in choice and in seeking more competitive prices(David Simchi- Levi, 2000).According to (Petrovic-Lazarevic, 2018)SCM dimensions are information technology; supplier and customer relationship, information sharing,

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internal operation, information technology and training. On the other hand (Martha C.Cooper, 1997) stated eleven analysis referential axis. These are Supplier Relationship Management, Customer Relationship Management, Order Fulfillment, Customer Service Management, Demand Management, Vendor Managed Inventory, Manufacturing Flow Management, Product Development and Commercialization and Returns Management. Supplier and Customer base Reduction and Consolidation, Postponed Manufacturing and Early Supplier Involvement.(Injazz Chen, 2004)also identified twelve SCM dimensions which are close partnership with suppliers, JIT Supply procurement, close partnerships with customers, Supply Chain benchmarking, few suppliers; many suppliers; strategic planning; outsourcing; sub-contracting and holding safety stock study.

SC orientation must adopted to infusion the SCM in to organizations include trust, commitment, common vision and goals of top management support(Brito, 2011).Similarly (Akintoye, 2002)identified key success factors for Construction SCM which consist of trust, reliability of supply; top management support; mutual interest; free flow of information; joint business planning; closer links between demand and supply; integrated information systems; and manpower development.(Mohamed Syazwan Ab Talib, 2014)found that collaborative partnership, information technology, top management support, and human resource to be major critical success factors for SCM implementation in organizations. On the other hand(Petrovic-Lazarevic, 2018; Sohal, 2000)mentioned six basic parameters as Suppliers and contractor relationship, internal operation, information sharing, information technology, training and supply chain integration.

2.4. Elements of SCM

2.4.1. Internal Operation

SCM underlines on the importance of both effectiveness and efficiency of companies' internal operations on its performance. This is because of internal operations in SCM is essential for developing a competitive advantage before commencing external integrations. Poor internal operations can lead to failure in coordinating with external partners(Kabossa A.B. Msimangira, 2003; Nichols, 1999).Internal operation summarizes activities related to service delivery and production, and internal logistics flow. To judge the SCM practice as an effective and value adding the internal operation should be flexible in responding to changing market needs, which is expressed on the basis of agility principles. This means that, a production system must be able to perform rapid change over in both order patterns and mass customization (M.Lambert, 1997).(Power, 2001)find that technology utilization, continuous improvement and computer based automation in manufacturing are some of characteristics of flexible organization. The main objective of SC integration is to coordinate activities across the SC so that the company can

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improve performance: reduce cost, increase service quality, reduce the bullwhip effect, improve efficiency, and respond effectively to changes in the marketplace (R. Vrijhoef & Ridder, 2007).

2.4.2. Information Sharing

Information sharing is one of the important aspects for achieving perfect integration in SC. Cross functional and inter organizational integration requires the visibility of information across the supply chain participants. Inventory levels, accuracy of forecasts, resource utilization and production costs depends on quality of information sharing between partners in a SC(Whang, 2000).(Stanley E. Fawcett, 2009)Many studies have stated that both suppliers and buyers can be benefited from information sharing by inventory reduction and reduced manufacturing costs (LT, 2003; P.Yu, 2001). The nature and level of information across the SC differs based on the degree of integration, institutional trust and availability of infrastructure that facilitate the practice (Petrovic-Lazarevic, 2018).Therefore, an information sharing is very important in the SC since information flow is an integral part of SCM and material flow is closely dependent on information flow.

2.4.3. **Information Technology (IT)**

Since information technology is involved in every step of operation in each company, it is not surprising that organizations' SCM supported by adopting IT. (S Talluri, 2000)types the comment that the advances in IT system is great opportunity in SC to run today's business. In SCM, IT is highly regarded as a major enabler in achieving effective SCM. As a SC spans many organizations in developing products to customers both up-stream, downstream and many functional areas within a company, the implementation of IT allows the companies to increase communication and coordination of various value adding activities with their partners and between functions within their own operation (Simchi-Levi, 2003). In addition, to advance development of the internet technology offers significant opportunities for cost reduction, increasing flexibility, increasing response time, and improving customer services (Whang, 2000). The benefits of IT in SCM do not come from the capabilities of IT itself; instead the significant benefits come from the combination of its application with corporate strategy and the nature of relationship between companies. IT will improve collaboration and coordination between supply chain members in the environment where trust and long–term commitment between partners exist (Bongsug Chae, 2005).According to (Li, 2005)the role of IT in SCM are; to provide the information availability and visibility to supply chain partners, to enable the collaboration with organizations in the supply chain and to allow the decision making based on the total supply chain information.

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2.4.4. Training

Current SCM requires managers to have an understanding of dynamic SC and ability to use information based tools. (Whang, 2000)argue that information visibility throughout a SC bring significant impact on companies if they do not have ability to utilize the information in effective ways. Hence companies need to consider the skills requirements and education when integrating their value-adding activities with their partners. The major concept of SCM is collaboration and seamless integration between various value adding activities within individual companies and across different organizations along a supply chain. Beginning this concept in to practice requires significant changes in corporate culture as well as a new level of human performance. Successes full implementation of SCM concept largely depends on human aspects of organizations(Donald J. Bowersox 2000; John T. Mentzer, 2001). Different studies indicate that, there are various complicated and sophisticated operations and decision making those primarily demand knowledge based employees. To this end, organizations are supposed to enhance and maintain existing skills and knowledge of employees. Continuous development and skill building activities demand are sources of competent employees (Petrovic-Lazarevic, 2018).Therefore, effective training and knowledge based learning is essential in developing and maintaining these new SCM skills.

2.4.5. Supply Chain Integration

SC is a set of companies participating in the upstream and downstream flows of products, services, knowledge, information etc. for the end user (John T. Mentzer, 2001; R. V. a. L. Koskela, 2000). It implies that SC constitutes a network of business relationships which implies that the success of a single business depends on its ability to integrate with other business companies.(Georgios A. Papadopoulos, 2016) Strengthen this idea by stating that the real competition is not company against company, but rather supply chain against supply chain. SCM as a management philosophy takes a system approach to viewing the Supply Chain as a single entity. This indicates that it is extended in to a multi-firm effort to manage flow of goods and services from suppliers to the ultimate customer. The integration is the quality of the state of collaboration that exists among departments and stakeholders that are required to achieve unity of effort by the demands of the environment. The management of the SC is basically management of the integration and activities among the members of system. The ultimate goal of SCM is togetherness and build a partnership with each other to increase the competitive advantage of the SC as a whole (John T. Mentzer, 2001). SC integration also enables to coordinate activities across the SC so that the enterprise can improve performance, reduce cost, increase service level, reduce the bullwhip effect, better use resources, and respond effectively to changes in the marketplace (David Simchi- Levi, 2000). Each participant in a SC directly or indirectly affects the effectiveness of other SC members, as well as the overall performance of the SC(Martha C.Cooper, 1997). To be effective in the digital economy, organizations must manage the system including the coordination of business, technology, people, and processes

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across extended enterprises (Nassar, 2010).(R. Vrijhoef & Ridder, 2007) Stated that SC integration substantially contribute to the overall performance enhancement of construction, enabling to control diversity of demand, and reduce unsteadiness of the production environment. It also improves the efficient integration of resources and new technologies, and binds the supply process against the impact of economic and social instability. As many companies have recently realized, different SCM challenges are met not only by coordinating production, transportation, and inventory decisions but more generally by integrating the front end of the supply chain, customer demand, to the back end of the supply chain, the production and manufacturing portion of the supply chain (David Simchi- Levi, 2000).

2.5. Challenges of Supply Chain management

The nature of construction industry consists of significant problems such as lack of communication, poor experience sharing habit, which are obstacles in SCM improvement.(Desta, 2015)reported that the "fragmented and adversarial nature of the construction industry" have directly negative effects on communication between all parties on a construction project. For a company to be competitive, its supply chain must be cost efficient, responsive, flexible and agile and must support customer requirements to receive the product they need in the right quantity, at the right time and at the right place. Ensuring the presence of all these characteristics is difficult anywhere(Kabossa A.B. Msimangira, 2003).(Stanley E. Fawcett, 2009)identified the most ten barriers to supply chain management and listed as Inadequate information sharing, Poor measurements, Unreliable operating goals, Organizational culture, Resistance to change, Poor alliance management practices, poor understanding of supply chain vision ,poor managerial commitment, limited resources, limited employee empowerment.

The effective implementation of SCM requires that company managers should overcome challenges which in turn help implementers to adopt remedies for them. Barriers to SCM are categorized as inter-firm rivalry and managerial complexity (Stanley E. Fawcett, 2009). Uncertainty in supply networks, globalization of the market, increment of product varieties and shortening of product life cycles have forced many organizations to look outside the box of their supply chain partners. On the other hand, African countries are facing many critical challenges like inferior logistics infrastructure, lack of skilled man power and professionals, technological challenges and economic incapability of economy of the countries (Kabossa A.B. Msimangira, 2003).

The nature of construction industry evolves significant problems such as lack of communication, lack of knowledge sharing infrastructure, which are obstacles the improvement SCM in construction.(DIBABA, 2015)indicated that knowledge sharing infrastructure is one of the primary barriers preventing the successful implementation of SCM in organizations. According to (Brito, 2011) Supply Chain Management is a collaborative relationship among members of different levels of the supply chain with emphasis on common and agreed practices performed

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jointly by two or more organizations. In terms of SCM constructs, (Injazz Chen, 2004) advocated five main constructs comprising of information sharing, long-term relationship, risk and reward sharing, cooperation, and processes integration. Most SCM related-problems mainly occur from uncertainties and an inability to co-ordinate several activities and partners.(Ofori, 2000) Believed that implementation of SCM philosophy in construction has the potential to solve problems. These challenges in construction industry are mentioned as win-lose arrangements, a focus on negative issues, uncertainty within construction process, a minimal exchange of information and knowledge, price competition and the environment of fear, dishonesty, and frustration.

2.6. Customer Focus

Another element of supply chain is customer focus. It is very significant maximizing the value of construction management (Emmitt, 2018; Zhang, 2008). Contractors and suppliers must understand the needs of the customer so that they can supply the customer with what he/she needs, not what he/she asks for. Customer satisfaction is dependent both on the end product and the process during which it is created, that is service quality. Early involvement of contractors and integration of design and construction in concurrent engineering are an important aspect in customer focus (Emmitt, 2018; Ofori, 2000; Zhang, 2008). In organizational terms improving customer focus requires firms to integrate market intelligence with design and product development much more closely, so that customer requirements are channeled directly to managers at key decision points. To achieve this traditional functional divisions based on development, design, production and marketing, may need to be eroded with decision making devolved as much as possible. Identifying user requirements and adding value to increase "satisfaction' pre-suppose that customers know what they want and their needs can be captured and translated into realizable products. The objective of supply chain in construction industry would be to ensure that firms are much better able to respond to customer requirements stating from conceptualization phases of a project and accelerate decisions during its realization phases.

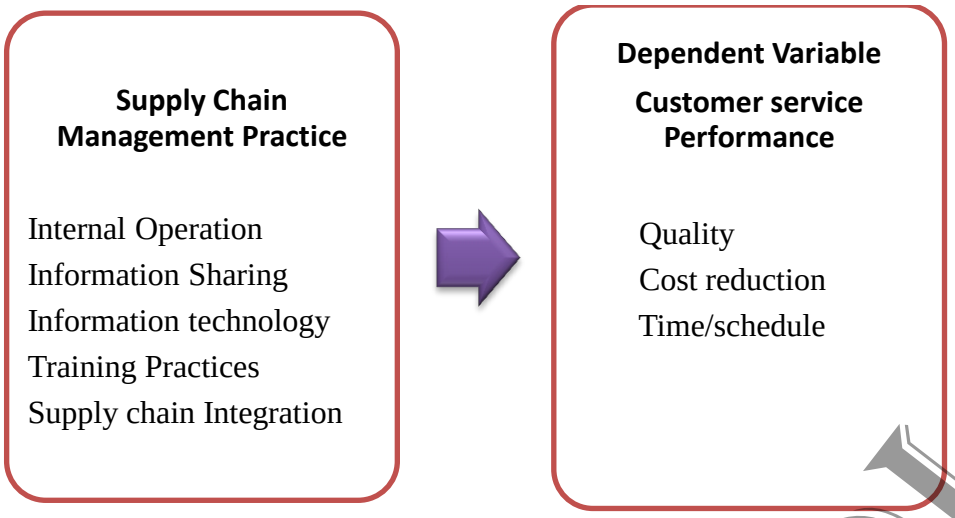
2.7. Identified Gaps

This chapter has discussed the SC, SC practices and SC challenges. From the literature reviewed it is clear that there is a gap that exists on challenges of SCM practices.

2.8. Conceptual framework

This section presents the conceptualization of supply chain management, which is also the conceptual framework of the study, based on the general supply chain management theories discussed above. The section methodically develops the conceptual framework starting from the assumptions through the concepts and principles adopted and to the applications in practice.

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Source: Researcher 2018

The research conceptualized that Suppliers and contractor Relationship, Internal Operation, Information Sharing, Information Technology and Training as main factors in SC practices. The researcher also identified that the common challenges of SCM in construction industry as Management commitment, Poor communication, Resistance to change, Shortage of skilled employees and risks.

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CHAPTER THREE

3. Research design and method of the study

3.1. Introduction

This chapter discussed the methods adopted while conducting this study. It focused on key methodological issues comprising research design and approach. Other aspects included in this chapter are sources of data; sampling and sample size determination; questionnaire design; instrument administration; data preparation and statistical tool.

3.2. Research design and approach

Research design chosen for this study is explanatory and both qualitative and quantitative research approaches are used.

3.3. Target Population

The population of the study covered the registered private grad one, grade two, grade three and grade four domestic Ethiopian road construction companies. According to Ethiopian contractors association record the total numbers of grade one up to grade four are 62 (Appendix -C). The respondent for questionnaires was general manager or personnel who were directly related with the topic. Interview was conducted with three management bodies of each company (procurement manager, supply chain manager, logistic and ware house manager).

3.4. Population and sampling techniques

3.4.1. Sample size

The researcher conducted all 62 companies (100%). The total population was taken as sample size.

3.4.2. Types of data and data collection instruments

The types of Research instrument were questionnaires & interview and the Primary source was used. The questionnaires were used to collect relevant data on existing practices and challenges of supply chain management system variables. Using interview guide unstructured face to face with the interviewee was conducted.

3.4.3. Primary data collection

Questionnaire and interview were selected to collect the primary data, through structured questionnaire and unstructured interview. The primary data conducted in the form of personal

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interview with procurement manager, supply chain manager, logistic and ware house manager. Through questionnaire which was distributed to general manager or personnel of the company who was directly related with the topic.

3.5. Procedures of data collection

Structured questioner was designed to collect primary data from professionals who took part in supply manager, Procurement manger, Human resource manager and Customers of the company. Questionnaires were prepared in English and Amharic language. The types of questions are open ended & closed items.

Questionnaire: Close ended questionnaire in a 5 point liker's scales was used to collect data from the sample respondents. The questionnaire has 5 rating scales ranging from 1-**Very Low** to **5-Very High**. Data gathered through questionnaires is simple and clear to analyses and it allows for tabulation of responses and quantitatively analyzes factors. Furthermore to this it is time efficient for both the respondents and researcher. The questionnaire was structured in such a way that it includes all relevant parts and information to clearly acquaint the respondents.

Interview: In order to obtain sufficient information the researcher used personal interview by management bodies of the selected companies and client. Research issues like awareness, of SCM Challenge, strategic view and logical Justifications of the case Companies were addressed through interviews.

3.6. Methods of data analysis

Descriptive and inferential analysis was used to show the relationship between independent variables and dependent variable. Descriptive statistics mainly percentage, mean, standard deviation and inferential analysis mainly persons correlation and multiple linear regression has been used. The results of the interview guides had integrated to the responses of employees through questionnaires and have been analyzed accordingly. Similarly facts of the observations also integrated to the responses of employees on questionnaires, and the comments of managers which have been investigated in the interview and then it have been analyzed accordingly. Data was analyzed using Statistical Package for Social Sciences (SPSS) V20.

3.6.1. Reasons to Select the Model

Spearman's correlation is the best fitting for investigating the relations of variables whose responses are provided with ordinal nature. And why this study uses correlation in general is due to the need to check the direction of variables relation under consideration whose dimensions are measured in questions-response of ordinal nature. A correlation coefficient has a value ranging from -1 to 1. Values that are closer to the absolute value of 1 indicate that there is a strong relationship between the variables being correlated whereas the values closer to 0 indicates there is little or no linear relationship. As clearly indicated by (Alaszwesski, 2006),the correlation is a commonly used measure of the size of an effect: the indicated value is represented as follows.

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±00-.19 very weak, ±.20-.39 weak, ± .40-.59 moderate, ±.60-.79 strong and ±.80-1 very strong

Multiple linear regressions

As it can be obtained from spearman‟s correlation the study tried to determine the relationship direction of the variables accordingly but in order to estimate the impact of one variable on the other the study has used multiple linear regressions. As predictive analysis, linear regression shows the effect of two or more independent variables on one dependent variable.

$$P = \beta 0 + \beta 1IOP + \beta 2IS + \beta 3IT + \beta 4TP + \beta 5SCI$$

Where:-

P = Performance;
IOP =Internal Operation Practices;
IS =Information Sharing
IT =Information technology
TP=Training Practices
SCI=Supply Chain Integration

3.7. Validity & Reliability of questionnaire

3.7.1. Validity Test

(Joseph F. Hair, 2007.) defined validity as the degree to which a measure accurately represents what it is supposed to. Validity is concerned with how well the concept is defined by the measure(s).

Internal validity: is how the findings of the research match reality and as the researcher measure the things that are aimed to measure. This specific study is poor in internal validity because of the inability to manipulate the independent variables. The other measure of internal validity is whether the finding is non-spurious or not. Therefore, the finding in this specific study is strongly supported by the reality in the context and the general theory in the field, even though factors such as context and methodology employed have shaped the result.

External validity: It refers to whether the observed associations can be generalized from the sample to the population, or to other people, organizations, contexts or time (Bhattachejee, 2012). The more representative, the more confident we can be in generalizing from the sample to the population. This study addressed external validity through taking every member of the association into consideration and can be generalized to other associations.

Construct validity: It examines how well a given measurement scale is measuring the theoretical construct that it is expected to measure. It can be classified as face validity and content validity. We use content validity when want to find out if the entire content of the

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behavior (construct) area is represented in the test. In this study, the researcher tried to address the construct validity through defining clearly the construct of interest and develop valid measures and operational defined constructs. Moreover, addresses through the review of literature and adapting instruments used in previous research.

Statistical conclusion validity: it examines the extent to which conclusions derived using a statistical procedure is valid. This type of validity is addressed through selection of the right statistical method used analysis. Therefore, the appropriate statistical testing is found to be Pearson correlation and Multiple Linear Regression is carefully selected by the researcher so that it realized the statistical conclusion validity.

3.7.2. Reliability Test

Reliability differs from validity in that it relates to not to what should be measured, but instead how it is measured. Reliability analysis is concerned with the internal consistency of the research instrument. Hair et al. (2007) defined reliability as the extents to which a variable or a set of variable is consistent in what it is extended to measure. To ensure the inner consistency, it was used the chronbach's alpha coefficient developed by Lee Joseph Chronbach. According to (Cronbach, 1951) alpha coefficient is a statistical tool that evaluates the reliability through the inner consistency of a questionnaire. According to the stability coefficient' Cronbach's Alpha', if the coefficient is < 0.60, the consistency and internal stability is considered weak, if the coefficient > 0.60 < 0.80, it is considered accepted, if the coefficient is varies between (0.80 - 0.85), it is good and if coefficient is >0.85 to 1, it is considered excellent.

Internal consistency should be determined before a test can be employed for research or examination purposes to ensure validity. In addition, reliability estimates show the amount of measurement error in a test. As such the first 30 respondents from which the study tried to test Cronbach‟s alpha were actually used to test if the items used are useful to measure the customer service performance and it was found to be attractive as it can be seen from the following table.

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Table 3.1 Reliability Statistics

N^{O}	Variables	Cronbach's Alpha	N^{o} of Items
1	Internal Operation Practices	0.882	4
2	Information sharing practice	0.728	3
3	Information Technology	0.728	4
4	Training Practice	0.937	4
5	SC Integration	0.715	6
6	Challenges of SCM	0.794	9
7	Customer service performance	0.876	10

As shown in the above table the reliability of the survey instrument used is more than acceptable which tells us that variables are consistent in measuring what they are desired to measure.

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CHAPTER FOUR:

4. Data analysis, interpretation and discussions

4.1. Introduction

This chapter presents the data analysis results, interpretations and discussion of findings and organized as follows: First it presents the response rate then the background information of the respondents. This is followed by analysis of supply chain practices that have been adopted by the research institutions. The chapter concludes with an analysis of the relationship between various supply chain management practices and firm performance using regression analysis. This chapter summarized the results of analyzed data collected and interview conducted about current supply chain management system in road construction industry. The discussion predominantly focuses on respondents profile, SCM practices, supply chain integration and challenges of SCM.

Table 4.1 Response Rate

Description	Population	Sample size	Returned	Percent
Size	62	62	51	82.26

Source: Research data (2018)

Out of sixty two (62) questionnaires distributed to respondents fifty one (51) which accounts 82.26%from the total population were filled the questionnaire correctly and returned back.responses were found valid and used for the analysis. Thus, based on the responses obtained from the respondents data presentation and analysis were made as follows.

4.1. Analysis of the Respondents' Profile

The demographic profile of the sample respondents is presented and analyzed below. The purpose of assessing respondents' work experience and education level of the respondents' is that, when the respondents are more experienced and educated they have better opportunity to understand the case and give better response than else.

4.1.1. Education qualification of respondents

Education is one of the factors that have impact on improvement of the practice of the companies, and also better opportunity to understand the case and give reasonable response than else.

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Table 4.1 Education qualification

Education Qualification	Contractors' Grade level					
	GC-1		GC-2		GC-4	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
12+3	3	7.9	3	23.1	0	0
BSC/BA	24	63.2	9	69.2	1	100
Msc/MA	11	28.9	1	7.7	0	0
Total	38	100		100		100

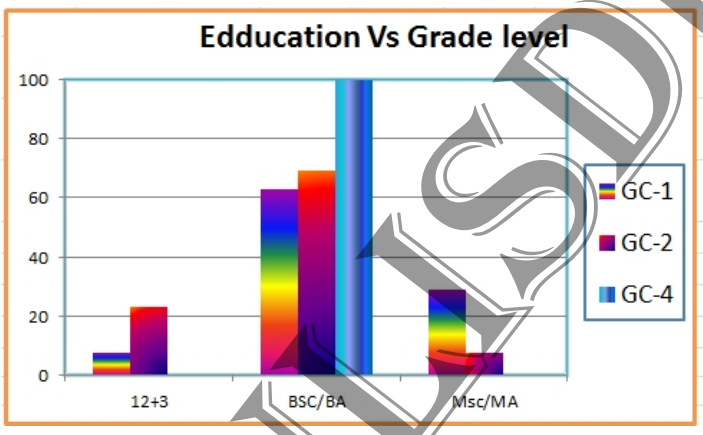


Figure 4.1-Frequency of Education qualification

As shown above in table 4.2 the highest education level attained by most of the respondents in all organizations was first degree holders which represents, 63.2%, 69.2% and 100% out of the valid respondents. The least percentage for grad one contractors was diploma and above education level which is 7.9% and the least percentage for grad two contractors was second degree and above. Therefore, out of valid responden100% are diploma and above diploma holders.

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4.1.2. Respondents work experience in the company

Table 4.3 Respondents work experience in the company

Work experience	Contractors' Grade level					
	GC-1		GC-2		GC-4	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
less than one year	3	7.9	2	15.4	0	0
between 1-2	6	15.8	4	30.8	0	0
year 3-5	8	21.1	1	7.7	1	100
year 6-10	12	31.6	5	38.5	0	0
>10	9	23.7	1	7.7	0	0
Total	38	100		100		100

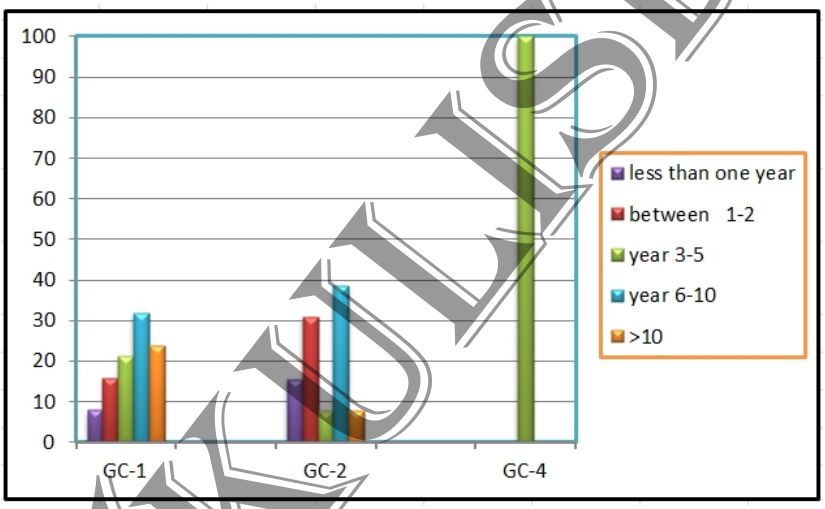


Figure 4.1-Respondents work experience in the company

As table 4.3 above clearly shows the frequency distribution of respondents work experience for general contractor-1, largest of the respondents 31.6% have between 6-10 years of work experience followed by 23.7% having greater than 10 years work experience. For general contractor -2 largest of the respondents 38.5% have between 6-10 years of work experience followed by 30.8% having between 1-2 years work experience. Even if sample for general contractor -4 was not representative, the respondent work experience was 3-5 year. In all grade levels, the largest proportion of the respondents have more than 3 years work experience with in the case company and it is sufficient to judge and give views. This is because when the respondents are more and more experienced within the organization they have better opportunity to know more and more about the organization.

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4.1.3. Respondents work experience in current position

The study sought to find how long the respondents had served their organizations in their current positions. The responses were as shown in the table below.

Table 4.4: Distribution of Respondents by length of service

Service year in current position	Contractors' Grade level					
	GC-1		GC-2		GC-4	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
<1year	2	5.3	1	7.7	0	0
Between 2-5 year	13	34.2	4	30.8	0	0
>5 year	23	60.5	8	61.5	1	100
Total	38	100		100		100

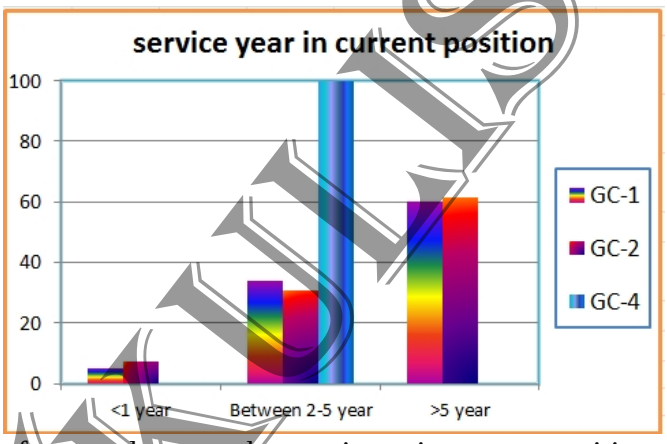


Figure 4.3- Frequency of respondents work experience in current position

From the table above, most respondents (>60%) in all grade levels had worked more than 5 years in their current positions and more than 90% had served for over 2 years in their present positions meaning they are competent to answer the questions.

4.2. Descriptive Statistical Analysis of SCM Practices

As it were revealed in the methodology part, the designed method is descriptive statistical analysis to analyze the five components of the conceptual framework developed for this study. In addition to the quantitative analysis, the qualitative information obtained through interviews from managers of companies is used to analyze the following issues. The analyses were on: Supply chain management practices, challenges of SCM and client services.

The listed items below are the most critical parts of the conceptual framework and basic research variables of this paper. Therefore, the discussion of conceptual framework components will

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answer the basic research questions and meets the stated objectives of this study. For the analysis of all these variables, mean value of the respondents has considered as an important indicator to the extent of the company's practices on each items. To conclude, the overall customer service performance of the case company's practices on each variable, group mean was calculated and used.

The mean and group mean statistical values approaching to 2.00 and less indicates the poor performance, 3.00, average/moderate while 4.00 and 5.00 indicates higher and very high/excellent performance of the company on that particular item and variable respectively.

As it was briefly mentioned in the literature part of this study, the most common supply chain management practices are supplier and customer relationship, internal operation, information sharing, information technology, training and supply chain integration (Sohal, 2000); (Petrovic-Lazarevic, 2018).This study focused on the selected companies SCM practices from these five perspectives. For each practices different items were developed and measured based on their mean and group mean values.

4.2.1. Internal Operation practice

Internal operation is the initial point to make the environment favorable for integration with the external partners. (Nichols, 1999)states that Poor internal operations can lead to failure in coordinating with external partners. As table 4.6 below illustrates that five items were used to see the extent of the internal operation of the case company.

Table 4.5:- Internal Operation Practice of SCM

Descriptive Statistics						
Variables	Contractor's grade					
	GC-1		GC-2		GC-4	All glade
	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Mean of mean
The level of flexibility of service giving system to handle order patterns	2.947	.83658	2.4167	1.62135	2.000	2.454567
Management know-how regarding supply chain effectiveness	3.210	1.18909	3.0000	1.41421	2.000	2.736667
The level of Efficiently utilization of resources	3.184	1.31221	3.0000	1.41421	1.000	2.394667
Group Mean	3.118		2.79167		2.00	2.528634
Valid N (listwise)	38		12		1	51

(Source: own survey, 2018)

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As stated by (M.Lambert, 1997)a service giving system must keep pace with rapidly change in both order patterns and mass customization. In view of this theory, from the mean values presented above in table 4.5, the following discussions have been made.

In case of GC-1, Management know-how regarding supply chain effectiveness has the largest mean values of 3.210 which approximates to moderate performance. The rest two items(the level of flexibility of service giving system to handle order patterns, and the level of efficiently utilization of resources) have almost similar mean value that is 2.947 and 3.184 respectively which approximately shows moderate performance. Thus the current performance of the companies indicates that, they have to take corrective actions to improve companies' preferences.

In case of GC-2, management know-how regarding supply chain effectiveness and the level of efficiently utilization of resources have similar mean values of 3.000 which approximates to moderate performance. The intention of efficiency is to minimize overall cost of materials, wastage of materials, time and effort, which ultimately ensures profitability of the company. There for intensive effort and improvement is mandatory in order to make an internal operation effective and efficient. The rest three items(level of flexibility of service giving system to handle order patterns)approximately shows poor performance in addition, the group mean of the companies' current performance indicates that , they have to take corrective actions to meet the customers' needs.

In case of GC-4, all the items mean value indicates approximately low and very low performance. However the sample size was not representative, the interview from company manager in addition to questionnaire result reviles that the coordination of internal activities was very weak. The fate of company relies on internal operation which is critical factor to measure organizations' potential to go for supply chain partners.

In general, each item's and group mean values of internal operation practice conveys moderate/average for GC-1 and GC-2 where as low for GC-4 internal operation practices are there in studied companies. Therefore, it implies that, the case companies have an assignment to improve its internal operation to create effective relation with external partners.

4.2.2. Information Sharing Practice of SCM

This study tried to investigate the practices of information sharing among the supply chain participants of the case companies. Accordingly, three items related to information sharing practice were used by the researcher. Table 4.7 below indicates, the mean value of each items and group mean that can generalize the information sharing practice of the case companies with its up and down-stream supply chain partners.

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Table 4.6:- Information Sharing Practice of SCM

Descriptive Statistics						
Variables	Contractor's grade					
	GC-1		GC-2		GC-4	All Grade
	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Man f mean
Material required related Information sharing with suppliers	3.657	1.02077	2.500	1.50756	2.000	2.719
Material requirement related Information sharing by projects	2.842	1.02736	2.583	1.50504	1.000	2.141667
Overall efforts of Inter-organizational information coordination and sharing	2.605	.94553	3.166	1.26730	3.000	2.923667
Group Mean	3.035		2.75		2.00	2.595
Valid N (listwise)	38		12		1	

(Source: own survey, 2018)

For GC-1:- Relatively, the high and the lowest mean values are scored by material supply forecast information sharing with supplier and Overall efforts of Inter-organizational information sharing that is 3.657 and 2.605 respectively. The rest item related to information sharing practice (Material requirement related Information sharing by projects mean values of 2.842 which approximates to moderate information sharing practice.

In case of GC-2:-All items (Material required related Information sharing with suppliers, Material requirement related Information sharing by projects and Overall efforts of Inter-organizational information coordination and sharing) of investigated companies have approximately average information sharing practice.

In case of GC-4:-Information sharing item (efforts of inter-organizational information sharing) has the average (3.000) mean values which indicate that, the case company has moderate information sharing practice.

In general information sharing is another important practice that should have to be given due attention in order to make the SC robust. Because, when there is distortion, inadequacy and lack of accuracy in information flows within the SC partners, it will negatively affect the SC participants. The mean value overall efforts of inter-organizational information coordination and sharing throughout the SC implies that, there is information sharing among the SC partners but it is not sufficient and it lacks accuracy under investigated companies. From the above presented data, the researcher can conclude that the information sharing practice between companies and

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suppliers is poor. This is based on the group mean value obtained with respect to all sated measurements. So that, having poor relationship with such suppliers is a cause for poor information sharing practices.

4.2.3. Information Technology

Advanced in information technology have given opportunities for organizations to transform the way they manage their business (Sri Talluri, 2000).
As table 4.7 reveals that, four items were used to measure IT application of the case companies.

Table 4.7:- Information Technology Practices of SCM

Descriptive Statistics						
Variables	Contractor's grade					
	GC-1		GC-2		GC-4	All Grade
	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Mean of mean
The level of IT-based automated ordering from major project & client	3.105	1.3108	3.166	1.52753	2.000	2.7573
The level of IT-based automated ordering to major suppliers	3.315	1.1879	3.083	1.67649	3.000	3.1330
up-to-datedness of IT throughout the supply chain	3.026	1.1965	1.833	1.26730	1.000	1.9532
The adequacy of IT systems throughout the supply chain	2.526	1.2678	2.833	1.52753	2.000	2.4532
Group Mean	2.9561		2.5833		2.000	2.5131
Valid N (listwise)	38		12		1	

(Source: own survey, 2018)

For GC-1: out of four items developed to see the extent of IT application in selected construction companies SC, all of the items scored the mean value approximate to 3 which implies moderate IT usage in customer service performance. In addition to the data collected through questionnaire, interview was held with the supply manager and inventory manager of the case companies. According to the interview there are poor information technology facilities within the companies. But, some GC -1companies implementing intra network connection facilities to connect supply inventory and purchasing sections. According to (David Simchi- Levi, 2000)the objectives of IT in SCM are; to provide the information availability and visibility to supply chain partners, to enable the collaboration with organizations in the supply chain and to allow the decision making based on the total supply chain information. Currently, some construction companies are using integrated information systems to manage their business activities.

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In case of GC-2: All items except up-to-datedness of IT throughout the supply chain have mean value approximately moderate. But up-to-datedness of IT throughout the supply chain is traditional in grade two companies. Since IT is the back bone of organizations' competitiveness, therefore to improve higher service level and reducing inventory and supply chain costs. Grade four companies are under the worst condition on the aspect of information technology usage.
To share information there should be an up-to dated IT and integrated information system which is capable of connecting all functional units of the company and its external participants. Based on the data collected both in questionnaire and interview and the analysis made on the IT practices, the existing IT System of investigated companies supply chain cannot support effective SCM implementation. Therefore, based on the mean value of each items, group mean and interviews, the SCM practice of IT in the selected companies is poor and conveys that a lot has to be done to bring about change in the IT system especially GC-2 and GC-4.

4.2.4. Training practice

As presented in the literature review, the fourth SCM practice is training. The ultimate objective of SCM is customer service as it was depicted in the conceptual framework developed for this study. To provide good customer service, organizations are supposed to enhance and maintain existing skills and knowledge of employees. According to (John T. Mentzer, 2001) the successful supply chain management implementation concept largely depends on human aspects of the organizations.

Table 4.8:- Training Practice of SCM
.

Descriptive Statistics						
Variables	Contractor's grade					
	GC-1		GC-2		GC-4	All Grade
	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Mean of mean
The Level of Adequacy of training and development for management	2.1579	.85507	1.666	1.23091	1.0000	1.607967
Employees training in supply chain concepts &management principles	2.7632	1.21776	2.000	1.27920	1.0000	1.921067
Provision of diversified skill training to employees	3.6316	1.26108	2.500	1.38170	1.0000	2.3772
Giving training to downstream supply chin members	3.2105	1.33878	3.000	1.90693	2.0000	2.7368

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Group Mean	2.9408		2.2916		1.25	2.1608
Valid N (listwise)	38		12		1	51

(Source: own survey, 2018)

With respect to this theory effective training and knowledge, based learning for both managers and employees of organizations is essential in developing and maintaining SCM skills.

Table 4.8 above shows four items developed to investigate the training practice of companies under consideration.

Grade one contractors have poor level of adequacy of training and development for management which has mean value of 2.1579. On the other hand the study companies under this category have good Provision of diversified skill training to employees. Whereas other two items (Giving training to downstream supply chin members and Employees training in supply chain concepts & management principles) have average mean result.

In case of GC-2: Have poor employees training in supply chain concepts &management principles And the Level of adequacy of training and development for management which have mean value of 1.666 and 2.000 respectively. The remaining two items are moderately practice as shown in the above table.

Grade four companies are in the worst situation on human resource aspect. This clearly implies that, there is a great problem with the human resource management area of the selected companies. These all practices of SCM require the human resources to make SCM effective. In addition to the responses obtained through questionnaire, there is an interview conducted with human resource manager and human resource officer. According to their response, still now there is no well-organized training program within the companies to the employees and managers. Even when some invitations come from government and other training institutions simply some managers or employees have been sent to the training without consideration of the relevancy of the trainee to the companies' real problem. If the case companies would not take actions in order to solve such poor practice and related problems, it creates great negative consequences on its SC.

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4.2.5. Supply Chain Integration Practice

4.2.5.1. Supply Chain Integration with Customers

As table 4.9 below above depicts, three items were used to evaluate the case companies integration with its customers or downstream of the SC.

Table 4.9 Company Integration with projects and client

Descriptive Statistics						
Variables	Contractor's grade					
	GC-1		GC-2		GC-4	All Grade
	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Mean of mean
Follow-up customers for feedback	2.7895	.96304	2.1667	1.02986	1.000	1.985
Monitoring and measuring customer service level	2.8684	.81111	2.7500	1.13818	2.000	2.5394
Frequency of contacts with major customers(clients)	3.2105	1.16614	2.8333	1.19342	2.000	2.6812
Group Mean	2.9561		2.5833		1.66667	2.4020
Valid N (listwise)	38		12		1	51

Source: Research data (2018)

In case of GC-1, the item has the highest mean value which is 3.2105 and indicates moderate information sharing practice. When the level of collaboration between SC partners is becoming strong and strong, it leads them to have strong integration, which in turn makes the SC more effective. So as to make integration with customers, the above listed items are some of the attributes to be considered. For measuring the extent of customers' service level, but the integration wants improvement to fully satisfy the customers. Therefore, based on the above data the group mean value implies that the case companies are in an average position to their customer information sharing practice.

In case of GC-2, the item Frequency of contacts with major customer is has the highest mean value which is 2.8333 and indicates moderate information sharing practice. Therefore, based on the above data the mean value implies that the case companies are in an average position to their customer in frequency of contact with customers. Whereas the item follow-up customers for feedback have the lowest extreme mean value which is 2.1667and it approximately indicates the poor practice. The remaining item (monitoring and measuring customer service level has mean values 2.7500 that indicates moderate integrations respectively.

In case of GC-4, the item follow-up customers for feedback have the lowest mean value which is 1.000 and indicates very poor integration. Therefore, based on the above data the mean value implies that the case companies are in the worst position to their customer with listed items.

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Therefore company under this category has to work hard on listed items to satisfy customers' expectation.
In addition to the mean value obtained through questionnaire, an interview was conducted with project manager, project supply head and supply manager to studied companies. According to their response, they have moderate integration. The group mean of all grade companies indicate the poor satisfaction of their customers and in a long-run there may be a chance losing their clients. Therefore, the result is not sufficient to create effectiveness and efficiency in SCM activities.

4.2.5.2. Supply Chain Integration with suppliers

In this part, the researcher tried to explain the level of integration between Ethiopian grade one up to grade four road contractors or general contractors (GC) with their suppliers. Integration is the process of combining or coordinating separate functions, processes, or producers and enabling them to interact in a seamless and continuous manner(Sweeney, 2012).As illustrated in table 4.10, there are three items used to determine the extent of integration of the case companies with its suppliers.

Table 4.10:-Supply Chain Integration with suppliers

Descriptive Statistics						
Variables	Contractor's grade					
	GC-1		GC-2		GC-4	All Grade
	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Mean of mean
The level of strategic partnership with suppliers	3.078	.71212	2.666	1.23091	3.000	2.9152
The establishment of quick ordering system	3.157	.82286	3.166	.83485	2.000	2.774867
Stable procurement through network Collaboration	3.026	.82156	2.666	1.07309	2.000	2.564333
Group Mean	2.8859		2.6666		2.6666	2.7397
Valid N (listwise)	38		12		1	51

Source: Research data (2018)

Accordingly for grade one Ethiopian general contractors (GC); relatively to other items the high mean value was scored on the establishment of quick ordering systemwhichis3.157 that indicates there is moderate strategic partnership followed by the level of strategic partnership with suppliers which is 2.078. Furthermore the group mean shows that 2.8859mean value. The groups mean value approximately reveals as moderate integration between target groups.
For GC-2, the level of strategic partnership with suppliers, the establishment of quick ordering system and stable procurement through network collaboration has mean values of 2.666, 3.166

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and 2.666 respectively which approximately indicate moderate integration between target groups. But as there mean value reviles, they have different influence on integration.
In similarly in case of GC-4,The level of strategic partnership with suppliers has mean value of 3.000 in which indicates moderate association between GC-4 and target suppliers' where the case company has poor integration to the remaining items.
In addition to the above questionnaire results, an interview was conducted with procurement and supply manager of the case companies to consolidate the information obtained through questionnaire. According to their response, GC-1 and GC-2 have domestic and foreign suppliers. This is due to the procurement method of the case companies a direct purchase method that is any supplier who fulfills requirements wins to provide the material.
But, according to the interview there is no stable procurement through networking. Due to the inconsistency between the response of the procurement and supply manager and the respondents of questionnaires, the researcher interviewed both local and foreign purchasers to clearly understand the level of integration with suppliers. They also assure the same point as the procurement and supply manager. They replied that the company has no strategic/planned relationship with its suppliers. But, sometimes the company made contracts with the winner suppliers for some month to a year especially bitumen, cement and equipment supply. Therefore, the researcher tried to identify the area for the respondents' difference through triangulated analysis. Therefore, based on information obtained from both sources (qualitative and quantitative) the level of integration between the suppliers and the case companies is not sufficient.

4.3. Correlation and Regression Analysis

In this section the results of the correlation and regression used in this study are presented. In order to test the research hypothesis, the Pearson correlation coefficient was calculated as well as multiple linear regression analysis. Based on the results obtained from the research, conclusions are drawn with respect to each hypothesis generated for the research undertaken in AWEP at which the research was conducted.

4.3.1. Correlation Analysis

The following table shows the degree of association between response variable and independent variables.
Table 4.11:- Correlation matrix

Correlations							
		SCP	IOP	ISP	(IT)	TP	SCI
customer service performance	Pearson Correlation	1	.671**	.681**	.694**	.708**	.822**
	Sig. (2-tailed)		.000	.000	.000	.000	.000
	N	51	51	51	51	51	51

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

* *Correlation is significant at the 0.05 level (2-tailed).*

Source: Survey data, 2018

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All explanatory variables (SC management practices) have strong and positive association with respondent variable. Supply chain integration has the strongest degree of association with customer service performance (r=0.822). As result of the above correlation matrices, the researcher has enough evidence to conclude that, all predictor variables have strong positive association with response variables. So the main question here is the impact level of employees SC practices on customer service performance. This can be answered through the use of multiple linear regressions with the help of SPS.

4.3.2. Regression Result

The impact of internal operation practices, information sharing, information technology ,training and supply chain integration on the supply chain management(SCM) of customer service performance have been measured through the use of multiple linear regression.

4.3.2.1. Assumptions of regression

When running a Multiple Regression, there are several assumptions to check the data meet, in order for the analysis to be reliable and valid.

Assumption #1: The relationship between the independent and dependent variable is linear.

The first assumption of Multiple Regression is that the relationship between the IVs and the DV can be characterized by a straight line.

Assumption #2: There is no multicollinearity in the data.

This is essentially the assumption that the predictors are not too highly correlated with one another.

Assumption #3: The values of the residuals are independent.

This is basically the same as saying that the observations (or individual data points) to be independent from one another (or uncorrelated).

Assumption #4: The variance of the residuals is constant.

This is called homoscedasticity, and is the assumption that the variation in the residuals (or amount of error in the model) is similar at each point across the model.

Assumption #5: The values of the residuals are normally distributed.

This assumption can be tested by looking at the distribution of residuals.

Assumption #6: There are no influential cases biasing your model.

Significant outliers and influential data points can place undue influence on the model.

The impact of individual predictors on the SCM of customer service performance has been predicted through the following coefficient table.

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Table 4.12:- Coefficients estimates

Coefficients						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	(Constant)	-.469	.284		-1.652	.106
1	Internal Operation (IO)	.076	.066	.105	1.149	.257
	information Sharing(IS)	.180	.085	.188	2.125	.039
	Information technology(IT)	.157	.082	.171	1.911	.062
	Training (TP)	.173	.077	.201	2.246	.030
	Supply Chain Integration (SCI)	.587	.144	.420	4.070	.000

Source: Research data (2018)

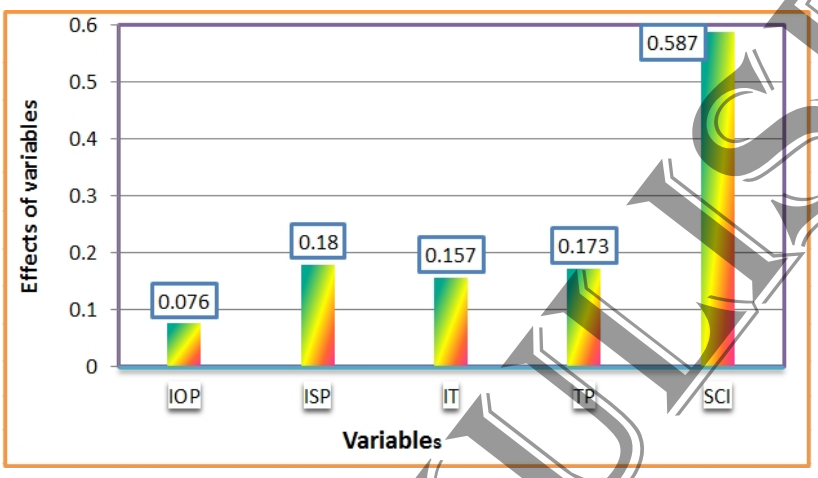


Chart 4-5 Coefficients estimates

$$P = -0.46 + 0.180\mathbf{IS} + 0.173\mathbf{TP} + \mathbf{0}.587\mathbf{CI}$$

Where:-

P = Performance;
IS =Information Sharing
TP=Training Practices
SCI=Supply Chain Integration

From the table above, supply chain integration has the strongest positive impact on customer service performance and the relationship is statistically significant at the 5% significance level (β = .587; p = .000< .05) followed by Training Practices which has a positive relationship with customer service performance and statistically significant at5% significance level (β = .173; p = .0.030< .05). Information technology also has a positive relationship with customer service performance but not statistically significant at the 5% significance level (β = .172; p = .0.062

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>.05). Information sharing also has a positive effect and statistically significant at the 5% significance level (β =0.18; p = .039<.05). The remaining variables (Internal Operation Practices) also have positive relationship but are not statistically significant at the 5% significance level (β =0.076; p = .257>.05).

From the above findings, supply chain integration, training practice, information Sharing were found to have strong positive statistically significant relationships with customer service performance. The other two variables, internal operation and information technology were found to have weak correlations which were not statistically significant. The is coping up with the study of (David Simchi- Levi, 2000) which is stated as SC integration enables to coordinate activities across the SC so that the enterprise can improve performance, reduce cost, increase service level, reduce the bullwhip effect, better use resources, and respond effectively to changes in the marketplace. However the study findings are contradicted with study results of (Whang, 2000) advance development of technology offers significant opportunities for cost reduction, increasing flexibility, increasing response time, and improving customer services.

Table 4.13:- Regression Model summary

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.897[a]	.805	.784	.25758

Source: Research data (2018)

As it can be seen from the model summary result above the stated predictor degree of association with the dependent variable i.e. customer service performance has been proved by R to be very strong accounting for 89.7% indicating very strong relation that exists between these selected variables by this study and the targeted dependent variable. These predictors (internal operation practices, information sharing, information technology, training practices and supply chain integration) whole sum effect on the SCM of customer service performance has been shown by adjusted R Square to be 78.4% which means these predictors influence on the variation SCM of customer service performance is this much and the remaining 21.6% variation in the customer service performance is explained by factors which have not been addressed by this study.

Table 4.14:- ANOVA

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	12.341	5	2.468	37.201	.000[b]
	Residual	2.986	45	.066		
	Total	15.326	50			

Source: Research data (2018)

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a. Dependent Variable: Customer service performance

b. Predictors: (Constant), Suppliers and contractor relationship, Information Sharing Practices, Internal Operation Practices, Training Practices, Information technology, supply chain integration

As it can be observed from the ANOVA table above F is large enough to prove that the model fits the requirements of measuring the effect of the stated variable being significant at the required significance level i.e. less than 0.05. This implies that SCM practices have a statistically significant relationship with customer service performance.

4.4. Challenges of Supply Chain Management

The study further sought to establish the challenges impeding the adoption of SCM practices by research institutions. The respondents were asked to rate the level of agreement with various statements on SCM on a scale of 1 – 5. The mean ratings were then computed and ranked and the items with a mean rating less than 3.50 were considered to be indicators of possible challenges in that respect. The table below shows the results.

Table 4.15:- Challenges of SCM

Nº	Items related to challenges	GC-1		GC-2		GC-4	All grade	
		Mean	Std. Deviation	Mean	Std. Deviation	Mean	Mean of mean	Rank
1	Challenge related to supplier inability	2.9167	1.31137	2.916	1.31137	4.000	3.2778	2
2	Challenge related to institutional trust	3.0000	1.20605	3.000	1.20605	2.000	2.6666	9
3	Challenge related to willingness to share risk	3.0000	1.41421	3.000	1.41421	3.000	3	6
4	Challenge Related to inventory fluctuation	3.0833	1.16450	3.083	1.16450	3.000	3.0553	5
5	Challenge Related to unplanned orders	3.0833	1.31137	3.083	1.31137	2.000	2.7222	7
6	Challenge related to employee ineffectiveness	3.5833	1.08362	3.583	1.08362	1.000	2.722	7
7	Challenge related to subsequent design change	3.5000	1.24316	3.500	1.24316	4.000	3.6667	1

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8	Challenge Related to financial impact	3.1667	1.64225	3.166	1.64225	3.000	3.1113	4
9	Challenge related to stoppage of operation	3.5000	1.44600	3.500	1.44600	3.000	3.3333	3
	Group Mean	3.2037		3.2037		2.7778	3.0617	
	N	38		13		1	51	51

Source: Research data (2018)

As illustrated in table 4.15, out of nine items used to determine the extent of major challenges in supply chain management.

In case of GC-1:- Challenge related to supplier inability shows the lowest mean value which is 2.917. This implies that the participants in the SC of selected construction Companies are not capable to submit materials sufficiently and to share benefits associated with their supply chain. When there is average supplier ability with the SC partners that conveys moderate relationship and integration among the SC partners. The implication is that the supply chain practice is traditional. It means, SC partners with in the chain do their own decision and take the responsibility for the demand of companies in an unsatisfied manner. The study result items challenges related to (institutional trust, willingness to share risk, inventory fluctuation, financial impact and unplanned orders) on the selected companies show moderate challenges which indicates existence of significant challenges .Whereas the rest items Challenge related to (employee ineffectiveness, subsequent design change and stoppage of operation due environmental impact)represented mean value of 3.5830, 3.00, 4.2941,3.00 respectively which approximately indicates existence of high challenges. The groups mean value for challenges of supply chain management of the case companies are high which is, 3.2037.The reason was financial impact, unplanned orders and employee ineffectiveness, which in turn was affected by both internal and external factors. Some of the internal factors are shortage of working capital, unnecessary bulk purchase, unskilled employees, and external factors are design change, environmental impact on a project, and suppliers' inability to provide the required inputs according their promises.

In case of GC-2:- Employee ineffectiveness and supplier inability have mean value3.583 and 2.916 respectively which indicates that, the selected companies exhibit high and moderate challenges in SCM. The remaining items related to challenges of studied companies (Challenge related to supplier inability, Challenge related to institutional trust, Challenge Related to inventory fluctuation, Challenge Related to unplanned orders, Challenge related to stoppage of operation due, Challenge Related to financial impact, Challenge related to employee ineffectiveness) have moderate impact on SCM. The groups mean value for challenges of SCM of the case companies are moderate which is, 3.2037.The main reason for exhibiting moderate challenge was institutional trust, willingness to share risk and supplier inability which in turn was affected by both internal and external factors. Some of the internal factors are unnecessary bulk purchase,

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inability of planning, and external factors are to unwillingness participants to share risk, employees' infectiveness and environmental impact.

In case of GC-4:- Challenge related to subsequent design change and supplier inability have value of4.000which exhibits high challenges of SCM followed by items (willingness to share risk, inventory fluctuation, financial impact and stoppage of operation due to environmental impact) which results similar value 3.000 (moderate challenge).The item employee ineffectiveness has average mean value of 1.00 which indicates the study company has negligible challenge related to this item. The challenges of studied company were mainly due to subsequent changes of rework, changes of working condition and time.

This does not necessary mean that all issue have equal influence on SCM operation. Thus the table 4.16 below rank the level of influence of the major issue discussed before.

Table 4.16:- Level of Risks in Challenges of SCM

Nº	Items related to challenges	GC-1		GC-2		GC-4		All grade	
		Mean	Rank	Mean	Rank	Mean	Rank	Mean of mean	Rank
1	Challenge related to supplier inability	3.1373	8	2.538	7	1.000	8	2.225	9
2	Challenge related to institutional trust	3.5490	6	2.692	3	2.000	6	2.7471	7
3	Challenge related to willingness to share risk	3.3529	7	3.307	1	3.000	2	3.2202	3
4	Challenge Related to inventory fluctuation	3.6078	4	2.769	6	3.000	2	3.12567	4
5	Challenge Related to unplanned orders	4.2941	1	2.923	2	2.000	6	3.0724	5
6	Challenge related to employee ineffectiveness	4.235	3	2.692	3	1.000	8	2.6425	8
7	Challenge related to subsequent design change	3.4510	6	2.230	8	4.000	1	3.2272	2
8	Challenge Related to financial impact	4.2745	2	2.538	7	3.000	2	3.271	1
9	Challenge related to							3.0608	6

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	stoppage of operation due to environmental impact	3.4902	5	2.692	3	3.000	2		
	Group Mean	3.7102		2.709		2.44		2.954	
	N	38		13		1		51	51

Source: Research data (2018)

As it can be observed in the table above, for GC-1 unplanned orders followed by financial impact have the highest influence whereas supplier inability has relatively the least influence. In case of GC-2 companies' willingness to share risk and unplanned order have the first and the second power of influence whereas subsequent design change has the least effect on SCM of studied companies. For GC-4 subsequent design change has highest influence and supplier inability and employee ineffectiveness have the least influence with equal share. In additions to the mean result of each item, the group mean of all items in each company grade shows that GC-1 companies are ranked the most challenges that affect SCM operation followed by GC-2 companies which have moderate challenges and the last one is GC-4 Company which accounts relatively the lowest challenge. The group mean value indicates that, challenges in supply chain management increases as grade of the contractor increases. Because as grade of the company increases, the number and qualification of employees, number of machineries and tools, the project complexity, the competitiveness or performance and some other criteria should be increase to fit with client's preference. Therefor supply chain management practices will be challengeable as customers' expectation increases.

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CHAPTER FIVE:

5. Summary of findings, Conclusions and Recommendations

5.1. Introduction

This chapter presents summary of findings, conclusions and recommendations. It is organized as follows: first it presents the summary of findings organized as per research objectives, then the conclusions drawn from those findings and finally both recommendations and suggestions for further study.

5.2. Summary of major Findings

The study was guided by seven specific objectives namely, to examine internal operation practice, to determine the approaches in information sharing practice, to explore the existing information technology usage, to evaluate the training practice, to examine the extent of SC integration, to assess the impact of current practice of private road construction companies on supply chain management performance and to identify the challenges of SCM for private domestic road construction companies.

Current supply chain practice in the construction industry are performed on fragmented basic with unstructured communication and no clearly responsibilities between the parties involved and these lead to low productivity, cost and time overruns, conflicts and disputes. As indicated on the statement of the problem part, case companies in construction industry are not achieving a corresponding improvement in their business performance due to failure to addresses the whole spectrum of SCM. This research tried to identify the current practice and based on this to explain the challenges in SCM faced by the case companies. Based on these facts, the summary of data analysis and interpretation of findings was presented as follows. The descriptive analysis and interview with management bodies has verified the prevalence of these characters of traditional relationship.

Different findings, (David Simchi- Levi, 2000; DIBABA, 2015; Petrovic-Lazarevic, 2018) showed that, internal operation practice and information are significant variables in supply chain management. But in this study these two variables found to be irrelevant. The significant data in this study are information sharing, training and SC integration and summarized as follows.

The mean of mean for all investigated companies results, overall efforts of inter-organizational information coordination and sharing ,material required related information sharing with suppliers and material requirement related information sharing by clients are listed in descending order i.e. overall efforts of inter-organizational information coordination and sharing has the highest result approaching to moderate internal operation in investigated companies. The Material requirement related Information sharing by projects is the weakest one from the listed information sharing practices.

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Training presents a prime opportunity to expand the knowledge base of all employees. The researcher find that, training practice is the second poorest SCM practices in studied companies which all mean of mean values are less than 3.00. The mean of mean of each item shows very poor than expected which adversely affects the effectiveness of SCM. The Level of Adequacy of training and development for management, employees training in supply chain concepts &management principles, provision of diversified skill training to employees and giving training to downstream supply chin members have mean of mean results 1.607967, 1.921067,2.3772 and 2.7368 which reviles poor, poor, moderate and moderate training practice respectively.

The group mean of mean for integration supply chain with customers results poor whereas the group mean of mean for integration supply chain with suppliers indicate approximately moderate integration. The study companies have to create integrated and concurrent project environment to grow and become more competitive in a highly competitive business climate.

In addition to the descriptive result, degree of association and between SCM practice and customer service performances as well as the individual effect of SCM practices on customer service performance is summarized as follows.

The correlation result shows that, variables, internal operation practices(IOP),information sharing practice(ISP),information technology(IT), training practice(TP) and supply chain integration(SCI) have positive and moderate to strong cross association. The degree of association between predictors and response variable was positive and strong. Supply chain integration has the highest association with customer service performance(r=0.822**) followed by training Practices(r=0.708**). Multiple regression result indicates also, supply chain integration has the highest influence (β = .587) on customer service performance.

The mean of mean in items of challenges of SCM indicates that, financial impact exhibits the highest value (3.271) from listed items reviles there is moderate financial challenge in study companies. Challenges related to subsequent design change and willingness to share risks are the second and the third challenges imposed on the companies.

From the discussion, analysis and interpretation of challenges, the higher the mean value mean the higher the Challenge. Accordingly, those having a mean value of high and average need to improve the practice.

5.3. Conclusions

The SC is a relationship between organization participated through upstream and downstream linkages in different value adding activities of products or service in the hands of the ultimate customer. Based on the results obtained and summary of findings the following conclusions are forwarded.

- The mean of mean result for targeted companies shows that, there is average information sharing practice. The researcher concluded that, Ethiopian road construction companies practiced below customer expectation. Companies will not bring virtual construction project improving co-ordination, visualization and construction supply chain management. This in turn should result in decreased profitability, lower quality of

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projects, increased construction time and cost, decreased client involvement and poor project performance.

- One of the most important things that can be done to ensure the supply chain operating at its peak is to train staff in all aspects of the supply chain within any organization since the most important asset of the organization is the workforce. They can hold the key to success and failure and this is certainly the case within the supply chain. As the result of both qualitative and quantitative analysis, the investigator concludes that the training practice in domestic road construction companies is moderate. Therefor care needs to be taken to ensure that staff within the supply chain knows how vital their role is and how they fit into the process to satisfy the customers need.
- The primary reason mentioned for poor level of customer service is supply chain integration. The objective of SCM is creating a relationship with other partners through the SC to provide products and services in order to satisfy the customers. According to the analysis result of companies' integration with both customers and suppliers, it is not sufficiently strong however the mean of mean shows moderate relationship. Therefore, these relationships between companies' SC participants are traditional, that is limited to current transaction.

- The conclusion of this study in general is, the case companies have traditional orientation for SCM that lacks efficiency and effectiveness. Based on quantitative and qualitative analysis results, the investigator be confidential to conclude that the case companies' SCM practices is poor towards customer service performance and its effect is clearly reflected on supply chain integration. SC integration practices play a decisive role for creating effective and efficient SCM. Poor integration facilities lead to poor information sharing and this makes SCM ineffective. Training Practice is the second reason to very poor customer service performance on studied companies. Information sharing practice is the third reason to have poor customer service. Effective communication is vital to the successful completion of any construction project which can improve teamwork and lead to better project collaboration. But the investigated companies have Poor communication that can result in misunderstandings, delays and problems down the road.

- According to the survey result, level of establishing relationships based on shared risks and rewards, level of trust among supply chain members, degree of willingness to share needed information, degree of adequacy of information system, level of employee loyalty and motivation/empowerment ,the extent of willingness to Share risks and rewards, level of flexibility of organizational system process, level of training for new mindsets and skills and the level of product quality and design are challenges for construction industry. The researcher concludes that the great challenges that prohibit effective SCM of study companies like employee ineffectiveness, subsequent design change, supplier inabilities are because of weak bond between SC partners. Thus companies with higher mean value have to improve the practice.

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5.4. Recommendation

Based the conclusion reached above, the following recommendation were forwarded in order to improve the SCM of the case companies.

- Information sharing serves as essential for the survival of business companies and enabler of supply chain integration. Targeted companies should enhance their information sharing capacity so as to accommodate greater communication between SC participants.
- For making internal operation effective, the human resource is a critical factor and in order to have skilled, committed, and capable employees and managers training is crucial. So that, Ethiopian private road construction companies are highly suggested to prepare training program for their employees and managers in order to enable them to be competent, committed, responsive, finally this improves internal operation and customers' service.
- More importantly, the case companies is suggested to improve its relationship with suppliers from simply buy-sale relationship to a modern supply chain relationship through establishing strategic or long term relationship, contract, and continuous information sharing in order to minimize supply uncertainty. The case companies also have to improving the relationship with customers through a continuous information sharing, follow-up them and get feedback, monitoring customers' perceptions towards service of the company, improving its compliant management through conducting market research for better responsiveness.

- According to regression result of, integration has the highest effect SCM practice of the study company followed by training and information sharing respectively. Therefore investigated companies have to take remedial measures according to their influential priority.

- The modern supply chain is becoming more complex. Businesses continue to keeping their supply chain under control but hidden risks still pose significant threat to the industry. According to this study, the company under consideration should give attention for considerable challenges imposed on the companies like challenges related to finance, subsequent design change and willingness to share risk.

5.5. Suggestions for further study

Owing to some limitations of this study, the following recommendations for future study were arrived at.

- The present study used only the construction companies , future studies should consider expanding their scope to include customers (end users) to ascertain the situation

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- The present study did not use quantitative measures of firm performance. It would be interesting to see whether similar results can be obtained using quantitative measures such as profitability.
- This study can also be replicated after five or more years to ascertain whether the situation would have changed.

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Appendices-A-Questionnaire

WOLKITE UNIVERSITY

COLLEGE OF BUSINESS AND ECONOMICS

DEPARTMENT OF MANAGEMENT

Questionnaire for data gathering purpose

The following set of questions describes **challenges of supply chain management Practice of road construction firms in Ethiopia** . It includes two kinds of questions.

The first set of questions require respondents to tick one of the alternatives that can represent the current practice and challenges of supply chain management in their organizations and the second set of question require respondents to give specific answer for questions followed by blank space.

Any response given be kept confidentially and wouldn't be used for any other purpose other than for the research work. Your participation is extremely important to me to conduct relevant thesis. However, if you encounter with difficult question or areas that you are not responsible, skip it.

- Name of the organization_____
- Grade of the organization_____
- **Year of service in the company**: Less than [], year 1-2 [],years 3-5[], years 6-10 [] , years more than 10 years []
- **Educational Qualification**:10+2 [],12+3 [], BSc/BA [], MSc/MA [], PhD [],Other (please specify) ----------
- **Related service year in supply chain management**. Less than 1 year [], between 2-5 year[], above5 year [].

1. Profile for **Supply Chain Management Practices** Using the following rating scales under the columns, ''tick" **(X)** only one box from the given box after reading the variable on the left hand.

B	**Internal Operation Practices**	1	2	3	4	5
1	The extent of continuous and instantaneous service improvement					
2	The level of flexibility of service giving system to handle order patterns					
3	Management know-how regarding supply chain effectiveness					
4	The level of Efficiently utilization of resources					
5	The extent of Internal logistics flow					
C	**Information Sharing Practices**	1	2	3	4	5
1	Material supply forecast Information sharing with					

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	projects					
2	Material required related Information sharing with suppliers					
3	Material requirement related Information sharing by projects					
4	Overall efforts of Inter-organizational information coordination and sharing					
D.	**Information technology(IT)**	1	2	3	4	5
1	The level of IT-based automated ordering from major project & client					
2	The level of IT-based automated ordering to major suppliers					
3	up-to-datedness of IT technologies throughout the supply chain					
4	The adequacy of IT systems throughout the supply chain					

E.	**Training Practices**	1	2	3	4	5
1	The Level of Adequacy of training and development for management					
2	Employees training in supply chain concepts & management principles					
3	Provision of diversified skill training to employees					
4	Giving training to downstream supply chin members /intermediaries					
F	**Customer service performance**	1	2	3	4	5
F1	**Construction Quality**					
1	The accuracy of order processing for customers					
2	Required material accessibility					
3	Effectiveness and flexibility in meeting customers' requirement					
F2	**Cost Reduction**					
1	Low Stock out frequencies					
2	Efficient use of the resource					
3	Effectiveness in West Reduction					
F3	**On time delivery**					
1	Timely invoice completion					
3	speed of order handling					
3	Effectiveness in customers' complaints management					
4	Keeping the project progress according to the schedule					
G	**Supply Chain Integration**					
G1	**Company's integration with suppliers**					
1	The level of strategic partnership with suppliers					
2	The establishment of quick ordering system					
3	Stable procurement through network Collaboration					

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G2	**Company's Integration with Customers (projects)**					
1	Follow-up customers for feedback					
2	Monitoring and measuring customer service level					
3	The level of supply information sharing with major customers					
4	Frequency of contacts with major customers(clients)					

2. Please indicate the degree to which you agree with the following c**hallenges** that have a direct influence on the performance of your company supply chain management.

H	**General factor**	Very low	Low	Average	High	Very High
		1	2	3	4	5
1	Challenge related to supplier inability					
2	Challenge related to institutional trust					
3	Challenge related to willingness to share risk					
4	Challenge Related to inventory fluctuation					
5	Challenge Related to unplanned orders					
6	Challenge related to employee ineffectiveness					
7	Challenge related to subsequent design change					
8	Challenge Related to financial impact					
9	Challenge related to stoppage of operation due to environmental change (environmental, seasonal and variation)					

In your opinion, what are the major challenges that your organization has faced in the implementation of SCM practices?

_____

_____

_____

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Appendix- B:-Interview Question

I. Supply Manager

1. How do you manage your supply chain? (close partnership with suppliers, out sourcing, subcontracting, few supplier, many supplier, holding safety stock, or use of external consultants)
2. What are the main internal & External challenges your department are facing in managing the Supply chain.
3. What about the level of Cooperativeness with Supplier and Customer.
4. What do you think the major factor contributing to the existing challenges?
5. How do you see the extent of information technology practice between your company and your partners ?
6. How do You express the effectiveness and flexibility in meeting Customers Requirement ?
7. How Do You express the relationship between your company and your supplier ?
8. How do you evaluate the extent of information sharing Practice between your company and your Suppliers?
9. What about the extent of integration between Your Company and Your Customers ?
10. Do think that it is important to establish strategic or long term relationship with suppliers?

II. **For Procurement Manger**

1. How do you see the customer service in different perspective?
2. How do you evaluate the extent of information sharing practice between your company and your suppliers?
3. What about the extent of integration between your company and your customers and supplier ?
4. Is there uncertainty of suppliers, sense of trust?
5. How do you evaluate the level of information technology between your company and your supplier and customer ?

III. For Human resource Manager

1. Does your company have training program & criterion in order to make employees & managers competent?
2. How do you see provision of multi skill training for your employees?
3. How does your company manage employee's complaints?
4. Does your company have flexible/agile man power?
5. How do you see the employees' commitment and initiation for work and learning?
6. How do you see the internal operation practices of your company?

IV. For Customers /Client / project

1. How would you see your relationship with contractor?
2. Does contractor provide the material need at the promised date?
3. How do you see information sharing practice between you/your company with contractor Company? What about the level of integration with you/your company and the contractor Company?
4. How would you see the required material accessibility of the contractor?
5. What about the willingness to share risks and benefits with contractor ?

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Appendix-C: List of studied companies

Nº	Contractor Name	Category	Tel.	Address	Date of Registration
1	Afro Tsion Construction P.L.C. (Sisay Desta G/Yesus)	GC-1	0116-632150	A/A	14/03/2008
2	Ahmet Aydeniz Construction	GC-1	0911 410385	A/A	7/4/2008
3	Amahara Road Works Enterprise	GC-1	0918 340986	Amhara	2/3/2008
4	Amhara Water Works Enterprise Construction	GC-1	0582200480	Amhara	9/3/2008
5	Aser Construction PLC	GC-1	0116-620357	A/A	26/1/2008
6	Ahmet Aydeniz Construction	GC-1	0911 410385	A/A	7/4/2008
7	Amahara Road Works Enterprise	GC-1	0918 340986	Amhara	2/3/2008
8	Beaeka General Business PLC	GC-1	0911 208875	A/A	20/4/2008
9	Bermog Construction PLC	GC-1	0116-610417	A/A	15/2/2008
10	C.G.C. OVERSEAS CONSTRUCTION ETHIOPIA LIMITED	GC-1	0911 758047	A/A	2/3/2008
11	CRBC Addis Engineering PLC	GC-1	0911 250321	A/A	5/12/2007
12	Cross-Land Construction (Yaregal Yifredew Mengistu)	GC-1	091120 0455	A/A	29/05/2008
13	Defence Construction & Engineering Enterprise	GC-1	0114 340948	A/A	19/2/2008
14	Diriba Defersha Amosha	GC-1	0911 214619	Oromia	13/05/2008
15	Emnete Endeshaw General Contractor	GC-1	0911 204543	Hawassa	20/1/2008
16	Ethio Canadian Business Group	GC-1	0910 092805	A/A	27/4/2008
17	Ethio General Contractor	GC-1	0114421569	A/A	29/04/2008
18	Ethiopian Road Construction Corporation	GC-1	0911144542	A/A	20/05/2008
19	Fal General Contractor	GC-1	0911 515348	A/A	28/3/2008
20	Gebrehiwot Equbemariam General Contractor	GC-1	0911-503336	A/A	24/2/2008

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21	Gemshu Beyene Botte	GC-1	0911 220678	A/A	14/03/2008
22	Geom Luigi Varnero P.L.C (Alber to Varnero)	GC-1	011551 4511	AA	5/2/2008
23	Giga Con.P.L.C. (G/HiwotGirmay)	GC-1	0911201990	A/A	15/4/2008
24	Hawa Adem Musse	GC-1	0915 330171	A/A	15/4/2008
25	Homa Construction (AdugneEjigu)	GC-1	0911 203670	A/A	12/5/2008
26	Keangnum Enterprises Limited	GC-1	0911627381	A/A	1/4/2008
27	Kif Construction	GC-1	0911203482	A/A	12/5/2008
28	MEDCON Engineering and Construction PLC	RC-1	0930 077470	A/A	5/4/2008
29	Melcon Construction PLC	GC-1	0911 512402	A/A	10/3/2008
30	N.K.H. Construction P.L.C.	GC-1	0912 059728	A/A	26/4/2008
31	Orchid Bussiness Group P.L.C.	GC-1	0911 238251	A/A	20/4/2008
32	Oromia Roads Const. Entrerprise	GC-1	0911505122	A/A	17/05/2008
33	Rama Construction PLC	GC-1	0911 202892	A/A	15/4/2008
34	Salini Costruttori S.P.A Ethiopian Branch	GC-1	0911504263/09 11200188	A/A	13/05/2008
35	Samson Chernet Road Contractor	GC-1	0911 200131	A/A	25/05/2008
36	SATCON Construction	GC-1	0911 206142	A/A	19/12/2007
37	Senan Construction P.L.C.	RC-1	0115538372	A/A	26/4/2008
38	Sunshine Construction	GC-1	0115 513289	A/A	30/3/2008
39	Sur Construction PLC	GC-1	0912 873647	A/A	16/3/2008
40	XUEKAI YU	GC-1	0911 95 39 24	A/A	22/04/2008
41	Yared Tekelemedhin Mengistu	GC-1	0911 220586	A/A	13/3/2008
42	Yemane Girmay Bisrat General Contractor	GC-1	0911 201415	A/A	10/3/2008
43	Yencomad Construction PLC (YemiruNega)	GC-1	0115533766	A/A	2/5/2008
44	Yirgalem Construction P.L.C.	GC-1	0911-478329	Hawasa	5/12/2007
45	Yirgalem Construction PLC	GC-1	0916 581380	Hawasa	6/4/2008

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46	Yotek Construction PLC	GC-1	115573196	A/A	5/4/2008
47	Afework GideyBerhe	GC-2	0911 633450	A/A	25/4/2008
48	Aklile Assefa General Contractor	GC-2	0911-226203	A/A	20/3/2008
49	Mat General Cont. (Tamirat Negash)	GC-2	0911219210	A/A	16/05/2008
50	Mikada Engineering & Trading PLC	GC-2	0911 67 85 92/0911-207757	A/A	22/12/2007
51	Narucon Construction PLC	RC-2	0911 525743	A/A	18/4/2008
52	Powercon P.L.C.	RC-2	0911 637282	A/A	20/4/2008
53	Qaga General Business PLC	GC-2	0911 213797/0915 579200	A/A	18/1/2008
54	Rocket Constrauction	GC-2	0911512430	A/A	19/05/2008
55	Samson Chernet Road Contractor	GC-1	0911 200131	A/A	25/05/2008
56	SATCON Construction	GC-1	0911 206142	A/A	19/12/2007
57	Rocket Constrauction	GC-2	0911 512430	A/A	19/05/2008
58	Tariku Tadess H/mariam	GC-2	0911872415	A/A	29/04/2008
59	Tesfaye Legesse Construction	GC-2	0911 428480/0911 513237	A/A	27/3/2008
60	Tewodros Simeneh Alemayehu	GC-2	0911 354613	A/A	18/4/2008
61	Zeta Construction PLC	GC-2	0911 232308	A/A	9/3/2008
62	Daniel Deyu Melelo	GC-4	0911014170	Debube	29/04/08

Source : Ethiopian grade one contractors association (2017)

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