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College of Business and Economics
School of Commerce
Graduate Program in Logistics and Supply Chain Management

Analyzing Construction Supply Chain Management Constraints and Mitigation Measures: The Case of Addis Ababa Housing Construction Project Office

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A Thesis Submitted to Addis Ababa University, School of Commerce in partial fulfillment of the requirements for the Degree of Masters of Art in Logistics and Supply Chain Management

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Advisor	**Signature**	**Date**
External Examiner	**Signature**	**Date**
Internal Examiner	**Signature**	**Date**

DECLARATION

I, Teshome Metaferia, declare that this thesis is my original work and that it has not been presented for a degree in any other university inside and outside of the country. All sources of materials used for the thesis have been duly acknowledged.

Signature: _____

Confirmed by Advisor:

Name_____

Sign_____

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ABBREVIATIONS

AAHCPO	Addis Ababa Housing Project Office
CSCM	Construction Supply Chain Management
GTZ-IS	Germany Technical Cooperation International Service
IT	Information Technology
PO	Project Office
SC	Supply Chain
SCM	Supply chain management
SPSS 21	Statistical Package for Social Science Version 21

ABSTRACT

The objective of this study is to analyze construction supply chain management constraints and the mitigation measures: The Case of Addis Ababa Housing Construction Project Office based on identifying the factors that affecting the SCM and mitigation strategy. In light of this objective, the study employed descriptive research. Simple random and non-probability sampling designs were employed based on the nature of the target population. Consequently, the study selected a sample of 259 individuals from 767 population. The data analyzed quantitatively using descriptive statistics. The analysis and finding shows that the factors that affecting SCM like lack of well information sharing on SCM, lack of Understanding the SCM environment, lack of conceptual knowledge on SCM and lack of Support from top management affects the SCM and some of the strategy to mitigate this factors are like Creating external communication systems, the use of performance measurement systems, application of IT in SCM, preparing detail and complete construction materials requirement plans, creating smooth working atmosphere between each process, sub process, section, prepare an extensive and comprehensive training program to equip the best employees. Based on the study, the researcher recommends the PO and other concern bodies should have maintain well information sharing system, prepare an extensive and comprehensive training program, apply IT in SCM, create smooth working atmosphere between each process, sub process, section, prepare detail and complete construction materials requirement plans.

CHAPTER ONE
INTRODUCTION

1.1 Background of the Study

Supply Chain management (SCM) was born in the manufacturing industry in the 1990's with the Just in Time (JIT) delivery system implemented in Toyota (Vrijhoef and Koskela, 1999), with the main aim of reducing inventories and regulating supplier's interaction with the production lines. Nevertheless, since its birth SCM has evolved into a full range of disciplines that involves closer customer-supplier relationships.

In construction industry, increasing number of construction organizations have started showing a realization towards the importance of SCM concept (Akintoye, McIntosh, and Fitzgerald, 2000; Vrijhoef and Koskela, 2000; Dainty, Briscoe, and Millet, 2001a) however unlike retail and manufacturing sectors, construction industry has been slow and reluctant in employing the concept of SCM (Love,2000).According to Ofori (2001) by using a SCM philosophy, various problems associated with the traditional practices in the construction industry can be resolved. These problems may arise due to the presence of uncertainties encountered by various construction processes; lack of exchange of information and knowledge; increasing price competition due to the purchases of supplies from numerous suppliers; and the existence of environment of fear, dishonesty, and frustration (Asad, Khalfan, and McDermott, 2005).

Proverbs and Holt (2000) advocate the use of the SCM philosophy as a means to effectively reduce the overall construction costs. They advocate early involvement of subcontractors and suppliers in a manner similar to the early involvement of the contractor during the procurement process. According to them this would give an opportunity to the concerned parties to offer their expertise which could result into potential cost savings and can become a stepping stone in improving two way communications among the collaborating partners.

Tan (2001) on the other hand has identified the key drivers towards fully integrated supply chain. According to him, these drivers may include; changes in the corporate culture, trust and communication among all the parties involved, information/knowledge sharing, suppliers' evaluation for supplier development process, and sharing common goals of waste elimination and increased efficiency.

Dainty et al. (2001a) have suggested changes which are required to make supply chain integration more effective. These changes include developing trust between parties; ensuring fair payments; early involvement with projects; educating the construction workforce; improving communication skills; knowing the operations of other type of organizations within construction supply chain; knowing the benefits of supply chain integration and partnering; understanding new contractual documents; client and main contractor organizations accepting that subcontractors can bring added values to the construction project delivery process; and willingness to share knowledge.

Barratt (2004) proposes a 'collaborative culture' for enhancing integration and improving collaboration among the supply chain partners within the construction industry.
In author's view, it is the collaborative culture using SCM is made up of number of elements including; external and internal trust; mutual pain and gain, information exchange in the supply chain, transparency and quality of information flow, communication and understanding, effective cross-functional activities and process alignment; joint decision making; use of measures to assess the performance of the whole supply chain, commit resources at the early stages of project development process, intra- and inter organizational support, corporate focus on SCM.

According to Dainty et al. (2001a) the construction industry is extremely fragmented in many countries with problems including the separation of design and construction, lack of coordination and integration between the various functional disciplines and poor communication. The end result for clients of the construction industry is dissatisfaction with outcomes in many cases and higher costs than necessary. Traditional management approaches tend to dominate the construction industry, unlike the manufacturing industry, with little awareness of alternatives that might lead to better outcomes. Suppliers delay can be defined as a discrepancy where actual completion of the project exceeds the planed period according to the contract (Chabota, Mundia, and Kayuka, 2008).

Effective control of SCM is challenged by different factors in Africa. According to Olawale and Sun, 2010, the top five factors inhibiting effective construction project delay; SC management constraint, design changes, inaccurate evaluation of projects time/duration, complexity of works, risk and uncertainty associated with projects and ill-performance of subcontractors and nominated suppliers.

Likewise, Kasimu and Abubakar (2012) conducted SCM constraint and construction delay study in the Nigerian construction industry and identified the top five factors that influence SCM constraint and construction delay in ascending order as improper information management planning, lack of effective communication, logistic control and design errors, shortage of supply like steel, concrete and slow decision making on SCM.

Mengistu (2010) showed that project controlling supportive techniques and SCM are not applied well for the control of actual and planned activities in the Ethiopia construction sector and recommends the significance of training requirement for the concerned project staff.

Similarly, Abadir (2011), found out that among the knowledge areas of project in Ethiopia, project logistics management is considered the critical one with only 24% projects managed well. There has been little significant research conducted in Ethiopia, however, on the extent to which the construction industry is merging the SC management constraints happen in Addis Ababa Housing Construction Project Office "Addis Ababa Integrated Housing Development Program Association fields. In particular, the extent of the construction awareness of both the concept of SC management and its methods is relatively unknown, particularly in countries such as the analysis of SCM constraint and its mitigation factors use in construction projects in the Ethiopian housing and construction and to understand its effect on construction project performance as perceived by SCM.

1.2 Statements of the problem

The rationale for conducting the current study comes from the fact that most studies conducted in the areas of projects delay in construction sector in Ethiopia are more than 5 years old and the booming of the construction industry needs up to-date investigation of its construction related supply chain management. Besides, most of the studies are conducted outside Ethiopia and are limited to part of the government housing construction like road or building in Construction supply chain management.

According to Addis Ababa Housing Construction Project Office 2015/16 reported that administering a large project condominium building it does not help the project to avoid major defects during construction due to logistics problem and supply inconstancy. AAHDPO has its own constraints like lack of work force, lack of construction material and above all lack of applying proper construction supply chain management (Ministry of Urban Development and Housing Construction, 2014).

According to Elias (2015) numerous housing development projects are happening across the country in parallel to the housing projects being undertaken by government. Despite this, the current need of registrants to new condos, especially in Addis Ababa, is so huge that the means and capacity of construction employed so far cannot build the desirable number of houses and satisfy the needs of residents. These constraints reflect back to the project material management, material supply, time, and their overall construction performance.

To summarize the situations of Addis Ababa Housing Construction Project Office, there are knowledge gaps that showed explicitly and implicitly the construction delay, inconsistency of material Supply and quality problems which are collectively observed by the construction supply chain management scenarios. Therefore, the Addis Ababa Housing Construction Project Office requires the scenarios in order to analyses the situations to find mitigation factor for delay of the construction projects that are most probably due to the unmanageable construction Supply Chain practices.

Because, having outlined and shaped features of CSCM procedure is significance to conduct, change and respond on accomplishment of construction site activities and aims to reduce the cost and duration of those activities. The primary concern, therefore, is to establish a reliable flow of the required construction materials timely. So the researcher is inspired to analysis and overcome the construction SCM constraint and its Mitigation Measures on Addis Ababa Housing Construction Project Office.

1.3 Research Questions

1. What are the constraints of SCM in Addis Ababa Housing Construction Project?
2. How would be Addis Ababa Housing Construction Project office have a system in place to mitigate supply chain constraint?

1.4 The Objective of the Study

1.4.1 General Objective

The General objective of the study is to analyze construction supply chain management constraints and the mitigation measures of Addis Ababa Housing construction project office.

1.4.2 Specific objectives

Specific objective of the study is as following below:

1. To analyze the constraints of SCM in Addis Ababa Housing Construction Project office
2. To identify the mitigation strategy for Supply Chain management constraint

1.5 Significance of the Study

In short, the generic premises offered by researcher on SCM will be contributes to better understanding and resolution of basic problems in construction supply chains, and gives directions for construction supply chain development. The practical solutions offered on SCM constraint, however, will help to developed in construction practice itself, taking into account the specific characteristics and local conditions of construction supply chains.

It has significance to Addis Ababa Housing Construction Project office on following the construction SCM procedures in dealing with SC Practice.

1.6 Scope of the Study

The study will be delimited geographically in Addis Ababa Ethiopia. Because, Addis Ababa Housing Construction Project office is located its construction project site in side Addis Ababa city. This study as subject of matter is specified on the analysis of SCM constraint and it mitigation measure which is the case study of Addis Ababa Housing Construction Project office. In other way targeted population will be Addis Ababa Housing Construction Project office crews.

1.7 Limitation of the study

Some of the respondents might not have been willing to reveal true information needed for the study for fear of any adverse repercussions. This was solved through explanation of the benefit of the study to the respondents and allowing the respondents to administer the questionnaires themselves. The researcher also assured the respondents that the research was only for academic purposes and all the information obtained will be treated with outmost confidentiality. The study used questionnaires for data collection, which were left with the respondents to be collected later after they were complete. The problems associated were loss of questionnaires, incomplete questionnaires and failure to give information. They were overcome by continuous follow up and by providing the questionnaires. Shortage of latest reference books and literature on the area in Ethiopian

content consider as limitation for this study. The study managed this limitation by using possible references.

1.8 Organization of the Study

This study will be organized in the following way. The first chapter will give a brief introduction of the research paper. It consists but not limited to problem statement, objective of the paper, research question. The second chapter supports the paper with both theoretical and empirical literatures. The research methodology will be explained in detail at the third chapter with a support of research design and method of data analysis. Findings / discussions and conclusion / recommendations will be explained in chapter four and five respectively

CHAPTER TWO
REVIEWS OF RELATED LITERATURE

2.1 Introduction

Any discussion from research back ground above of construction supply chain management (SCM) is usually informed by a wide range of definitions. In other words, SCM can be defined as the integration of suppliers and customers into the decision-making processes, focusing on the planning, implementation and control of the logistics operations to pull materials through the supply chain and can be defined as network of different organizations, linked upstream and downstream in a chain, aiming to produce quality and value in the services and products for the end user consumers through integrated processes and activities (Kannan and Tan, 2005).

Above point SCM within the construction is through aggregating the supply and demand which has four major SCM roles have been identified (Vrijhoef and Koskela 2000). Firstly, the focus can be on the impacts of the supply chain (SC) on site activities. The goal is to reduce the costs and duration of site activities. In this case, the primary consideration is to ensure dependable material and labor flows to the site to avoid disruption to workflow. This may be achieved by simply focusing on the relationship between the site and the direct suppliers. The contractor, whose main interest is in site activities, is in the best position to adopt this position. Secondly, the focus might be on the SC itself, with the goal of reducing costs, especially those relating to logistics, lead-time and inventory. Thirdly, the focus may be on transferring activities from the site to earlier stages of the SC. This may take place simply to avoid inferior on site conditions, or to achieve wider coordination between activities, which may not be possible in cases where the site construction has many technical problems. The goal is again to reduce total cost and time and, suppliers or contractors may be the initiators. Fourthly, the focus might be on integrated management and improvement of the SC and the site production. Thus, site production is subsumed into SCM, with clients, suppliers or contractors as possible initiators.

According to Larry (2002), SCM is characterized by client urgent demand of project material supply to complete the construction by client preference of speed over cost and quality, and the balance of project managers among project scope, budget and resource available. A study conducted in Zambia road construction identified fourteen major causes of schedule variation Chabota *et al.* (2008).

This diversity of definitions and understanding presents a challenge, which this research addresses. Research explores a wide range of conceptual issues that help it to understand the nature of supply chains in construction. In addition, there is case-study material reflecting the work of some of the leading proponents of SCM in Addis Ababa Housing Construction Project office on following the construction SCM procedure constraint. The premise for this research is as the main focus for the SC management of the construction process, towards the supply chain and its management as the main focus. The supply chain is the focus for more effective ways of creating value for clients; as a vehicle for innovation and continuous improvement, integration of systems and perhaps even improved, industry-wide, profitability levels.

2.2 The theoretical concept on Supply chain management

The supply chain management 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' (Christopher 1992). Value creation is increasingly viewed as a process facilitated through a supply chain – a network of relationships within which firms are positioned.

New and Westbrook (2004) suggest that firms in supply chains must build networks so as to provide complementariness between inner and external abilities, that is to say, effective supply chains need to be supported in networks that extend beyond the immediate linkages of exchange in order to create the value in each link. In the same way that individuals are drawn to, or naturally seek, other individuals with skills, knowledge and attributes that they themselves lack, firms are drawn to form collaborative relationships with other firms with skills, knowledge, attributes and perhaps resources that are complementary to the first firm. Just as individuals in society find it difficult to survive isolated from others, isolates in business are vulnerable and may fail in time unless they possess a unique skill or talent which gives them market power (for example a monopoly supplier or oligopoly of few suppliers in a market of buoyant demand). The term *supply chain* implies a linear process. This linearity, however, exists only at a high level of abstraction. At an applied level, when it explores the nature and operation of supply management, there is limited linearity, clusters of suppliers coming together in series of dyadic exchanges. Social and market exchanges create social and technical systems which, once in place, are observed as dynamic networks of relationships.

To remain competitive, companies must seek new solutions to important Supply Chain Management issues such as modal analysis, supply chain management, load planning, and route planning and distribution network design. Companies must face corporate challenges that impact Supply Chain Management such as reengineering globalization and outsourcing on why is it so important for companies to get products to their customers quickly and faster product availability key to increasing sales.

According to Westbrook (2004), a management consultant specializing in manufacturing and information systems is substantial profit advantage for the extra time that you are in the market and your competitor is there first, you are likely to get more orders and more market share." The ability to deliver a product faster also can make or break a sale. If two alternatives products appear to be equal and one is immediately available and the other will be available in a week, which would you choose? Clearly, Supply Chain Management has an important role to play in moving goods more quickly to their destination.

2.3 Supply Chain Management Today

If we take the view that Supply Chain Management is what Supply Chain Management people do, then in 1997 Supply Chain Management has a firm hand on all aspects of physical distribution and materials management.

According to Love, (2000) Stated on the SCM, the Supply Chain Management department is expected to increase its range of responsibilities, most often in line with the thinking that sees the order fulfillment process as one coordinated set of activities. Thus the functions most often cited as planning to formally include in the Supply Chain Management department are: Customer service performance monitoring, Order processing/customer service, Supply Chain Management budget forecasting. On the other hand, there are certain functions which some of us might feel logically belong to Supply Chain Management which companies feel are the proper domain of other departments. Most difficult to bring under the umbrella of Supply Chain Management is: Third party invoice payment/audit, Sales forecasting and Master production planning. According to Larry Rich man, (2002) Stated that Today Supply Chain Management includes services such as: Operational Analysis and Design Materials Handling, Distribution Strategy, Operational Improvements, Distribution Management, Computer Systems, Warehouse Design Project Management, Operational Commissioning, Computer Simulation and Technical seminars.

2.4 Supply Chain Management in Construction Sector

The construction industry is extremely fragmented in many countries with problems including the separation of design and construction, lack of coordination and integration between the various functional disciplines and poor communication. The end result for clients of the construction industry is dissatisfaction with outcomes in many cases and higher costs than necessary. Traditional management approaches tend to dominate the construction industry, unlike the manufacturing industry, with little awareness of alternatives that might lead to better outcomes (GTZ-IS/ Ethiopia, 2015). Firstly, the focus can be on the impacts of the supply chain (SC) on site activities.

The goal is to reduce the costs and duration of site activities. In this case, the primary consideration is to ensure dependable material flows to the site to avoid disruption to workflow. This may be achieved by simply focusing on the relationship between the site and the direct suppliers. The contractor, whose main interest is in site activities, is in the best position to adopt this position. Secondly, the focus might be on the SC itself, with the goal of reducing costs, especially those relating to logistics, lead-time and inventory. Thirdly, the focus may be on transferring activities from the site to earlier stages of the SC. This may take place simply to avoid inferior on site conditions, or to achieve wider coordination between activities, which may not be possible in cases where the site construction has many technical problems. The goal is again to reduce total cost and time and, suppliers or contractors may be the initiators. Fourthly, the focus might be on integrated management and improvement of the SC and the site production (Vrijhoef and Koskela 2000). Thus, site production is subsumed into SCM, with clients, suppliers or contractors as possible initiators. As with mainstream management literature, the literature on construction supply chains has been evolving with corresponding influences from the theory of production, distribution, and strategic procurement. There has been little significant research conducted, however, on the extent to which the construction industry is merging the SC and industrial organization fields (Nishiguchi 1994). In particular, the extent of the industry's awareness of both the concept of SC integration and its methods is relatively unknown, particularly in countries such as the East Africa countries. In terms of structure and function, the special characteristics of CSC are that it is:

1. A converging SC, directing all materials to the construction site where the object is assembled from incoming materials. The "construction factory" is set up around a

single product, in contrast to manufacturing systems where multiple products pass through the factory, and are distributed to many customers (Vrijhoef & Koskela 2000).

2. Apart from rare exceptions, a temporary supply chain producing one-off construction projects with repeated reconfiguration of project organizations. Accordingly, the CSC is typified by instability, fragmentation, and especially by the separation between the design and the construction of the built object (Vrijhoef and Koskela 2000).
3. A typical make-to-order SC, with every project creating a new product or prototype. There is little repetition, again with minor exceptions. The process can be very similar, however, for projects of a particular kind (Vrijhoef and Koskela 2000).

The above characteristics also have an impact on the management of SCs and Vrijhoef and Koskela (2000) have identified four major roles of SCM in construction, depending on whether the focus is on the SC, the construction site, or both.

Firstly, the focus may be on the impact of the SC on site activities. The goal is to reduce the cost and duration of site activities. In this case, the primary consideration is to ensure dependable material and labor flows to the site to avoid disruption to workflow. This may be achieved by simply focusing on the relationships between the site and the direct suppliers. The contractor, whose main interest is in site activities, is in the best position to adopt this focus.

Secondly, the focus might be on the SC itself, with the goal of reducing costs, especially those relating to logistics, lead-time and inventory. Material and component suppliers may also adopt this focus.

Thirdly, the focus may be on transferring activities from the site to earlier stages of the SC. This may take place simply to avoid inferior on-site conditions, or to achieve wider concurrency between activities, which is not possible on site because the site construction has too many technical dependencies. The goal is again to reduce total cost and time. However, suppliers or contractors may initiate this focus.

Fourthly, the focus might be on the integrated management and improvement of the SC and the site production. Thus, site production is subsumed into SCM. However, clients, suppliers or contractors may initiate this focus (Vrijhoef and Koskela 2000).

The following practical initiatives advance SCMs in each of the four roles:

1. **Role 1:** Improving the interface between site activities and the SC: It was previously reported that among the clearest initiatives of SCM in construction has been in the field of logistics (Asplund and Danielson 1991; Wegelius-Lehtonen and Pahkala 1998). That is, the focus was on the co-operation between suppliers and contractors for improving the full flow of material, whereas the traditional treatment of construction logistics and material handling had predominantly focused on activities occurring on site (Johnston 1981).

2. **Role 2***:* Improving the SC: This includes initiatives aimed at the development of specific SCs, such as those of prefabricated concrete elements (Laitinen cited in Vrijhoef and Koskela 2000) or elevators (Luhtala, Kilpinen, and Anttila, 1994). In-depth cost and time analyses are important for identifying potential improvement and for developing the SCs (Wegelius-Lehtonen 1995). When developing the supply chain, the trade-off between transportation, inventory and production costs should be borne in mind in order to achieve global improvement. Productivity and supply chain performance are decreased by the following factors: uncertainty in the SC, varying site conditions and varying capacity conditions (O'Brien 1995).

3. **Role 3**: Transferring activities from the site to the SC: This is another group of initiatives that aims at redesigning transfer of on-site activities to the SC. Industrialization, especially prefabrication, can be regarded as a structural means for eliminating on-site activities from the total production chain (Warszawski 1990). Thus, the earlier actual initiatives towards industrialization of construction must also be seen as a form of SCM concentrating on the design of the SC (Sarja 1998).

4. **Role 4**: Integration of site and SC: New alternatives have been suggested for the integrated management of the SC and the construction site. These include open building (Van Randen 1990) & sequential procedure (Bobroff and Campagnac 1987).

From a production point of view, the basic benefit of open building is in the postponement of the decisions of users regarding the interior of the building. This is realized by separating the infill from the structure. This also provides adaptability for the remaining life cycle of the building so that users can reconfigure the space as their needs change. In the sequential procedure, the idea is to structure the site work as successive realizations of autonomous sequences (resembling group technology as developed in manufacturing). In

both approaches, the goal is to replace construction's usual temporary chains with permanent SCs. Furthermore, pre-engineering is another related approach, where the customer may choose a pre-engineered building from a certain range of options (Newman 1992). The SCs for such buildings are typically stable. Design-build arrangements (Bennett, Pothecary, and Robinson, 1996.), although more restricted in scope, can also be classified in this group. In critical terms, prior initiatives on construction SCM have had only limited impact on the industry, and their wider application has been slow. Some of these initiatives are so new that it can be argued that they are in the first stages of their diffusion, typically following a Scurvy, which tends to grow slowly in its early phases. Even industrialization, which is the oldest existing initiative, has nevertheless not generally made the breakthrough into building construction (Warszawski 1990).

A better understanding of construction SCs is clearly necessary in order to comprehend the reasons for the difficulties of SCM's advance within construction. However, there is a trend in Ethiopia towards using foreign companies on construction projects, with a requirement that each foreign company associate with at least one local counterpart company. Though both foreign company and local company may agree on the importance of supply chain management, they often differ in the way they implement it. For instance, there is a contrast in the way each party approaches knowledge sharing and coordination. The contrast between the two supply chain parties makes the implementation of supply chains in the Ethiopia different from that in other developed countries (GTZ-IS/ Ethiopia, 2015).

2.5 Factors contributing to Construction SCM success

According to Henry, Rado, and Scarlett. (2012), the critical factors affecting the performance of construction supply chains are: following the organization's procedures in dealing with CSCM; information sharing; supply chain technical background; support from upper management; understanding the SCM environment (retailers, manufacturer, raw materials); and supporting the objectives of the related production system. Greater awareness of the importance of these factors may lead to successful SCM implementation in the future.

a) Information Sharing

Information sharing has become an important feature among organizations as the value creating factors are shifting from physical and financial assets towards intangible assets. Since SCM emphasizes effective and efficient flows of both physical and non-physical

assets both directions starting from the main supply source of raw materials towards the consumption of the product or use of the service by the end-customer, the alignment of information -a "two way shared" asset which does not diminish as it is used, which instead gets depth as it is used and shared- in a common value network, constitutes the key characteristic of integrated supply chains (Zhou and Benton,2010).

Information sharing allows firms to make better decisions on ordering, capacity allocations, production and material planning (Cheng,), through increased visibility of demand, supply and inventory (Ding, Guo and Liu,).

b) Supply chain technical background

Ross (2000) identified the complexities in defining supply chain technical background, recognizing that the concept involves a matrix of applications and can be defined in various ways. He viewed supply chain technical background as a comprehensive, dynamic, growth-oriented, competitive management approach that is nurtured by globalization, change and uncertainty.

c) Understanding the SCM environment (retailers, manufacturer, raw materials)

UN-HABITAT (2011) stated that understanding the SCM environment (retailers, manufacturer, raw materials) is based on the following three dynamics: Operations management techniques where all the organizations' functions – marketing, manufacturing and finance – are optimally utilized and integrated to form the common business system. These techniques offer competitive advantage by adding value to the day-to-day performance of regular activities. The three sets of activities are inbound logistics, processing activities and support activities. Integrated logistics management is extended to the interchange logistics activities. The objective at this level is to interface closely with, not merge, the identical functions performed by logistics counterparts in outside supply channel partners. The main rationale of this dynamic process is that an organization needs support from its internal as well as external supply chain partners to gain competitive advantage and market leadership.

Strategic dynamics that concentrate on reducing delivery times and costs, and adopting new management techniques and management information system to achieve breakthroughs in products and services that satisfy the ever-changing customer needs. This focus opens up a new dimension for the organization and gives it a competitive edge through forming alliances with channel system partners and offering relationship-based marketing to suppliers and customers.

d) SCM supporting the objectives of the related operation system

(Burt, Dobler, and Starling, 2003) argued that all supporting the objectives of the related operation system of a supply chain should further concentrate on a series of value-adding functions:

- **Quality** – should relate to Total Quality Management (TQM) to offer the best possible product and service given the market segment;
- **Cost** – should focus on strategic cost management programs by reducing the total cost throughout the chain;
- **Time** – aim at reducing lead-time so products and services are available to the end users in the minimum possible time;
- **Technology** – should be used appropriately both internally and externally with the members of supply chain to gain competitive advantages; and
- **Continuity of supply** – develop appropriate supplier relationships by monitoring the trends in the chain and marketplace.

e) Support from top management

Management support is critical in SCM (Van Hoek, R. I., Chatham, R., Wilding, R, 2002). Dinter (2012) shared the same view that top management support is vital for strategy success.

Furthermore, a good communication, employee involvement and recognition, cross-functional interaction and committed managers are indications of participative management in SCM. Moreover, the top management support comes in the form of allocating resources, reward and time, supporting strategic purchasing, develop strategic supplier relationship and striving for information technology adoption (Chen, I. J., Paulraj, A, 2004).

In addition, Lin et al. (2013) proposed communication, motivation, commitment and continuous implementation are the elements of top management support in supply chain quality management (SCQM).

However, managerial complexity and poor visions from top management are barriers to successful supply chain integration. Therefore, SCM is among top management agendas.

2.6 Mitigation Strategies

This research study, on the other hand, is looking for mitigation measures for those construction supply chain constraints of Addis Ababa Housing Construction Project office so far mentioned in the previous chapters. To accomplish this, the author aimed and designed to implement mitigation strategies in order to provide a set of propositions for improving construction supply chain management such as benchmarking, improvement of supplier's/subcontractors performance, elimination of waste, training and information sharing between parts of the supply chain. There are no quite significant academic studies on methods to improve Construction Supply Chain Management, on the other hand big construction companies show increased interest to improve the construction supply chain and to succeed an effective management of the construction chain.

Development of a set of propositions for improving construction supply chain management would be helpful to develop structured approaches between the construction companies and their contractors, resulting in better results for the entire supply chain. The proposition of these managerial practices also promotes a different discussion in terms of supply chain improvement in construction. First, these practices are focused on the strategic level, in which there is a lack of research. Second, the shift from an operational to a strategic view places supply chain improvement as a corporate matter that should be taken in consideration for strategic planning purposes. Many scholars of the subject agreed that Mitigation strategies to Improve Construction Supply Chain Management described briefly as follows (Georgios A. Papadopoulos*, 2016):

2.6.1 Suppliers' and Subcontractors' Development

The interface between construction companies and their contractors is continuous through the whole duration of a project. In this sense, the performance delivered by the contractors influences the overall performance of the project. Major companies related to manufacturing have developed initiatives concerned about suppliers' development. Such initiatives comprise structured programs based on training, consulting, and feedback provided to the suppliers. In general, these programs are led by the focal (major) company within the supply chain, which invest capital to support these programs in order to obtain better results in terms of cost, quality, dependability, among others, from its suppliers. After this period, the suppliers are ranked and some of them are conducted to a higher level of development in a new cycle.

2.6.2 Performance Measurement

Measure the performance of the processes is an ongoing challenge for companies from all sectors. Research regarding performance measurement is recent and provided frameworks that provide guidelines for managers in implementing performance measurement. Usually, the difficulties are first concentrated in defining the metrics and second in using the information provided by them for improvement. Nevertheless, the use of performance measurement systems proves to be crucial in order to face the current market competition. The use of standardized metrics to assess the performance of suppliers and provide feedback for them is a powerful approach for supply chain management improvement. Such approach refers to the traditional view of PDCA cycle (Plan, Do, Check, Action), in which "Check" is totally related to performance measurement and give directions to correct the course of action.

2.6.3 Benchmarking

The development of benchmarking is still incipient in supply chain management. Benchmarking is based on best-practices exchange between companies in order to obtain improvement in their processes. Also, benchmarking can also be directed to compare the performance of metrics in order to establish goals to be reached in a determined period of time. In this sense, it would very helpful for the construction companies to promote benchmarking in their sector, considering the best practices for management and identifying the gap between their internal practices and the benchmarks. Nevertheless, the implementation of a benchmarking program is a complex initiative, requiring efforts to align expectations and develop trust within the entire supply chain.

2.6.4 Knowledge Management

In a typical supply chain, the suppliers develop knowledge not only about their products and services but also about supply chain management. Even though there are many suppliers in a single supply chain, it is rare to observe a focal (major) company that gather knowledge from its suppliers. In this sense, clearly is established an opportunity for implementing knowledge management in supply chain. The establishment of an integrated platform for knowledge sharing can deliver substantial results for supply chain improvement, especially in construction companies that are used to have internal knowledge management practices.

2.6.5 Waste Identification and Elimination (Lessons Learnt)

Research about waste identification and elimination is still incipient. However, the adoption of practices aiming at identifying non value added activities or processes and eliminate them can improve supply chain management. An investigation of the processes in a detailed way can produce a total redesign of their flows and lead to optimized processes. Also, at the operations level (purchasing, stocking, handling, etc.) some efforts could be done in order to identify redundant activities and eliminate them. The application of this philosophy throughout the many tiers of supply chain can deliver great results from a systemic point of view, given that the interaction between the companies is constant and their individual results influence the overall performance of supply chain.

2.6.6 Information Technology

The application of IT in SCM has significant benefits. The use of web-based information system in SCM will reduce interfacing barriers between the several parties on the supply chain. The information and communication technology (ICT) will improve supply chain performance, support supply chain efficiency, and enable greater supply chain integration. The several supply chain participants (i.e. Contractor, Suppliers, Subcontractors, etc.) should develop compatible IT application software and common analysis methods of the complex data.

2.6.7 Human Resource and Training

The importance of human factor is very important and qualified employees are required. In this sense, companies should periodically prepare an extensive and comprehensive training program to equip the best employees with proper training benefiting as a result the supply chain processes. Managerial support and employee commitment and strengthen by effective training, it will lessen the supply chain implementation barriers and will enhance supply chain performance.

2.7 Improvement in management practices control of the construction supply chain

In a study in to construction logistics, it was found that the purchasing price is the dominating criterion for supplier selection (Wegelius, Pahkala, Nyman, Vuolio, and Tanskanen, 1996.); an ending which Jarnbring (1994) con**t**ras. SaKrkilahti (1993) found that subcontractors are predominantly selected on the basis of price.

The classification of drivers is based on a survey carried out by Rao (2005), in which two main factors were identified as the most significant, sustainability motivators and

economic motivators. In addition, additional research has commented on the influence of external pressures and the purchasing process itself (Hall, 2000; Morton *et al.*, 2002).
Sustainability motivators refer to the improvement in management practices to prevent significant construction impacts as well as develop new environmental solutions (Rondinelli and Vastag, 2000).

Economic Motivators refer to the reduction in energy use, raw materials, increase market share or any strategy that could be translated into financial capital (Morrow and Rondinelli, 2002). External pressures refer to any external force capable to initiate these types of practices and finally the motivation of improving the purchasing process itself the analysis on this section will be for groups of barriers that are linked because of their nature. The first group is formed by lack of resources, short term planning and lack of markets for recyclable materials.

These are linked because they all deal with availability of resources (financial or human) for CSCM. Lack of resources is probably the most important barrier identified because the sources needed have to compete with other company's priorities (Stoesser, 1997).
In addition, the costs and efforts involved in the design, development, documentation, implementation and certification of a CMS usually discourage smaller companies in which financial resources are restricted (Rondinelli and Vastag, 2000).

Finally, lack of markets for recyclable materials can become a barrier for companies trying to implement product-based strategies (Rao, 2005). There are some limitations of in effective integration, coordination and management of the chain from suppliers to final clients affect the Construction Companies and the supply chain integration Management of materials and information flows affect Construction

2.8 Improving the interface construction activities and the supply chain

It is a subjective limitation that the logistics initiatives have stressed (average) costs particularly, and thus failed to address the impact of supply chain variability on site assembly. In this regard, the last planner method Ballard and Howell, (1998) provides an appropriate augmentation. In addition, there is an objective limitation due to the narrow focus of this role in relation to the whole supply chain. For instance, it is quite possible to improve the dependability of the deliveries of a supply chain through bearing, without addressing the whole supply chain, but the improvement of the dependability of the total supply chain would be a more efficient and effective solution.

CHAPTER THREE
RESEARCH DESIGN AND METHODOLOGY

This chapter describes the research methodology adopted throughout this study to meet the research objectives and to address the research questions. It describes: the choice of particular research designs, research approach, sample and sampling techniques, source of data collection, data collection instruments and the method of data analysis.

3.1 Study Area

The Study Area of this Research is Addis Ababa Housing Construction Project Office which is found and executes its duties in the City Government of Addis Ababa. From Project office, a relevant professional crew will be chosen for Data Collection purpose because the office is settled here in Addis. And, the Participants are going to be selected from the project office in relation to create more understanding about how Supply Chain management situations look like in Government Owned Construction Sectors. To the end, it is planned to find mitigation measures in the study, to accomplish this, the participants are communicating during their construction implementation practice effectiveness which in turn bring about change on thought and give them the necessary attention.

3.2 Research Approach

The study has used quantitative research as a research approach to describe the current the status of SCM implementation in Addis Ababa Housing Construction Project office. Researcher applied two types of research approaches, namely qualitative and quantitative approach (Saunders et al, 2007). Most researchers argued that the best method to use for a study depends on the purpose of the research, researcher data and the accompanying research questions. This study has used a quantitative approach. The researcher collected data using quantitative method and analyzed the data by using descriptive research methods.

3.3 Research Design

This research has used the descriptive survey method. According to Kothari (2008) descriptive survey methods are concerned with describing the characteristics of a particular individual, or of a group, whereas factor analyzer research method on studies determine the frequency with which something occurs or its association with something else. As against this, studies concerned with specific predictions, with narration of facts

and characteristics concerning individual, group or situation are all examples of descriptive research studies. This research adopted quantitative methods. For these accomplishments primary data collection mechanisms has employed for primary data, questionnaires, which were structured and self-administered and containing items of measured on the 5-point Likert type has employed. Kothari (2008) stated that, questionnaires are used to manage time, energy and finance in an economical manner. Similarly, it provides quantitative data, which is very easy to collect. The study considered questionnaires, which have advantages over other types of research instruments. They are relatively cheaper, do not require as much effort from the questioner as face-to-face or telephone surveys, and often have standardized answers that make it simple to compile data. The questionnaires were hand-delivered to the respondents and collected after a few days. The types of questions that used in this study include both open and close-ended questions to ensure that the given answers were relevant to the topic. The research phrased the questions clearly in order to make clear dimensions along which the respondents analyzed. In open-ended questions, the respondents, thus giving them the freedom to express their feelings, provided the space for relevant explanation. This method considered as effective for the study in that; it created confidentiality. The presence of the researcher was not being required, as the questionnaires were self-administered.

3.4 Population and Sampling Techniques

3.4.1. Target Population

The study target populations comprise two major components: head office and branches. Meanwhile, housing construction projects currently composed of three packages are grouping housing units which do have the same starting date. So the target population for this study is Addis Ababa Housing Construction Project office which is implicitly and explicitly related and relevant to supply chain management system. This includes: professionals, contractors, consultants and officials. The total population is 1957, however conveniently package one has nothing to do with this study because it comprises housing units that are already completed and transferred to end users which in turn indicates no contractors and consultant in the site. Furthermore, the professionals late alone focus and consider those who do have long term availability in the head office, have high reputation and veteran in supply chain management aspect, therefore, those included in the target population from branch could not be included. Thus the effective target population will become 767. From 767 populations 662 from contractors, 20 from consultant and the remaining 85 from Addis Ababa Housing Construction Project office.

3.4.2. Sampling Method

Sampling is related with the selection of a subset of individuals from within a population to estimate the characteristics of whole population. The two main advantages of sampling are the faster data collection and lower cost (Kish, 1965 and Robert, 2004). Each observation measures one or more properties of observable subjects distinguished as independent individuals. In business research, medical research, agriculture research, sampling is widely used for gathering information about a population.

A sample is part of the universe of interest. Sampling is used to gain an understanding about some features or attributes of the whole population based on the characteristics of the sample. For this study, the researcher used simple random (Probability) sampling method and purposive sampling techniques to administer questionnaires and to obtain a representative sample. The main reason that the researcher has decided to use purposive sampling was by assuming as they have better know-how and direct contact with the real SCM of the construction from PO and consultant. For contractors the research has used simple random. The primary benefit of this method is each unit included in the sample will have certain pre assigned chance of inclusion in the sample. The sample size of contractors calculated separately by the approach used to be determining the number of respondent samples in this study is a simplified formula provided by (Kothari, 2004). Zikmund and Babin (2010) determining the sample proportion success and not success based on the experience from previous survey research response rate. Saunders, Lewis and Thornhill (2012) state that the likely response rate shall be reasonable 50% or moderately high, while Patrick (2003) referring Babie (1979), the return or success rate 50% is 'adequate'; 60% response rate is 'good' and 70% rate or higher is 'very good'. Having this experience, for this research purpose confidence of successfully collect or return rate is expected to 70% because the respondents are currently doing their jobs on the construction site and the respective branch officials will help me in distribution and collection of questionnaires and the remaining might be defected or non-response, and sample size is determined at 95% confidence level.

Determine the size of the sample size for population (Kothari, 2004):

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

Where:

- z = z score level of confidence of the estimate (in the case of 95% = 1.96);

- e = marginal error, 5%
- P = proportion of the sample successfully collected (p=0.7)
- q = failure of sample (1-0.7= 0.3)
- N = population of the sample (662)

Mathematically:

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

Where, z=1.96, e=0.05, p=0.7, q=0.3, N=662

$$n = \frac{1.96^2 * 0.7 * 0.3 * 662}{0.05^2(662-1) + 1.96^2 * 0.7 * 0.3}$$

$$n = \frac{534.06}{2.459}$$

$$n = 217.18, \ \underline{\mathbf{n = 217}}$$

Among the effective target population, the sample size (respondents) of contractors, 217, considered for the study. Although, supply chain management is led by higher level managers, senior experts and officers have a direct contribution on the implementation of Supply chain management activities. In this case, heads of departments and senior experts will obviously information rich than others because they have more experience, exposure and responsibility. Therefore, as result of these, 22 heads of departments and senior experts are included the sample purposively. Additionally, all consultants selected based on purposively.

Finally, the sample size for contractor's strata is 217, Addis Ababa Housing Construction Project office Supply Chain Management affiliated crew is 22, and all 20 consultants were considered. Therefore, the total sample for this study is **259**.

3.5 Data Sources and Types

For research design and research method mentioned above, the primary and secondary data sources have used from Addis Ababa Housing Construction Project office. The primary data includes questionnaires; on the other hand, secondary data sources have taken from literatures data found in books, journals and documents that have employed to generate data.

3.6 Data Collection Procedures

The primary data for this study were collected by using questionnaires, structured and open ended questions. While using structured questionnaires, the researcher only follows certain path and not crossing any type of limit.

3.6.1. Questionnaires

Demographic Questionnaires were initiated from the scratches and developed after critically commented and reviewed in consultation with relevant professionals by the Researcher. This involves, age, education level, year of experience and the position they are currently working. To accomplish the data collections, the primary technique for collecting the primary quantitative data used a self-developed questionnaire, containing items of measured on the 5-point Likert type and open -ended questions.

3.7 Ethical consideration

As Saunders et.al (2007) mentioned, research ethics deals with how the researcher treat those who participate in the study and how to handle the data after collection. Thus the researcher has tried to keep the privacy of the respondents by introducing clearly about the purpose of the research as it is for academic purpose only and by avoiding personal questions to protect the identity of individuals from being known by readers and also the information gathered has kept confidential.

3.8 Data Analysis Techniques

According to Kombo and Tromp, (2011), the data analysis procedure includes the process of packaging the collected information putting in order and structuring its main components in a way that the findings can be communicated easily and effectively. After the fieldwork done before analysis, all the questionnaires adequately checked for reliability and verification, editing, cleaning, coding and tabulation were carried out. For this research work the researcher has used only closed ended questions. Because the responses that responded from the respondents on open ended question is almost similar to the questions provided in closed ended questions. The results obtained were analyzed and interpreted by using descriptive statistics included use of frequencies, means and percentile. The data presented in the form of tables, frequency, mean and percentages with description.

3.9 Reliability and Validity Tests

According to (Mugenda and Mugenda, 2003) reliability is a measure of the degree to which a research instrument yields consistent results or data after repeated trials. To ensure reliability of the instrument, a pilot study was carried out. The instrument was pretested through a pilot study before the actual data collection to enhance reliability.

The importance of pre-testing a questionnaire according to (Creswel, 1999) is to help the researcher understand the meaning of the questions to be responded and how they arrive at their response. The researcher carried out a pilot testing on 10 professionals of Addis Ababa Housing Construction Project office.

Multiple indicators of a variable are used to increasing reliability, two or more of indicators of the same construct are better than one (Neuman, 2007). Statistical validity also used to measure the validity of the research through the use of correct statistical procedure and instruments (Neuman, 2007). To ensure the statistical validity of the study, the researcher has collected quantitative data using survey questionnaire and analyzed the data. The data were analyzed using correct statistical instruments like descriptive statistics.

According to (Adams et al., 2007) internal validity used to assure the research validity. To treat the internal validity of this research, a questionnaire was distributed within the same period and collected within two weeks and reasonable sample was taken from the population and questionnaire randomly and purposively distributed to participants. The major objective of the pilot test was to get feedback on the questionnaire way of preparation, wording, coherence and any other valuable comment and to incorporate any important comments and finalize the questionnaire.

The reliability of the study assessed with Cronbach‟s Alpha (α); it is the most common measure of scale reliability (Field, 2006). According to (Neuman, 2007), Cronbach‟s Alpha used to assess the uni-dimensionality. Reliability refers to the extent to which your data collection techniques or analysis procedures will yield consistent findings (Saunders et al., 2007). (Dunn, 2001) also defines reliability, as a measure's stability or consistency across time. The Alpha value ranges from a minimum of zero to a maximum of 1.0 for a perfect score, a good measure of the alpha should be 0.70 or higher (Neuman, 2007). According to (George & Mallery, 2003) scales exhibiting a coefficient of alpha greater than 0.90 is considered to have excellent reliability, between 0.80 and 0.90 are considered

to have good reliability, between 0.70 and 0.80 are considered to have acceptable reliability, alpha value between 0.60 and 0.70 indicates the reliability is questionable, when the coefficient alpha is between 0.50 and 0.60, the scale has poor reliability and the coefficient alpha is less than 0.50 it is unacceptable. The researcher measured the reliability of the data using Cronbach's Alpha, detail seen in the table 3.1 below.

Table 3. 1 Reliability Statistics

Cronbach's Alpha	N of Items
.843	27
.891	14

Table 3.1 shows that the Cronbach‟s Alpha value for final survey is between 0.8 and 0.9 according to (George & Mallery, 2003), which is good reliability. Therefore, all variables and questionnaire were acceptable for further analysis

CHAPTER FOUR
DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.1 Introduction

This chapter presents the main parts of this study by interpreting; presenting and analyzing the collected data on the Construction Supply Chain Management Constraints and Mitigation Measures. Quantitative data was collected from primary questionnaires. According to the research objectives, statement of the research problem and research questions, the presentation, analysis and detailed interpretation of the data was made.

Data gathered through Likert scale questionnaires were analyzed using Statistical Package for Social Science (SPSS) version 21. The questionnaire for likert scale was scaled as strongly agree, agree, neutral, disagree and strongly disagree. Descriptive statistics (frequency, percentage and mean) method of analyzing is used for the whole analysis.

4.2 Response Rate

For this study, 259 questionnaires were distributed for three group respondents. These 259 questionnaires were share out for the three group (contractors, consultants and Project office). Thus 217 questionnaires were distributed for contractors group and 172(79.26%) were properly filled and returned, 20 questionnaires were distributed for consultants group and 20(100%) group were properly filled and returned and 22 questionnaires were distributed for Project office group and 18(81.8%) were properly filled and returned. After the distribution of 259 questionnaires 210(81.1%) were properly filled and returned.

4.3 The Demographic Characteristics of Respondents

The following three tables present the demographic backgrounds of the three group sample population for this study one by one.

Table 4. 1 Demographic Characteristics of PO

Characteristics		Frequency	Percentage
Age	< 25	1	5.6
	26-34	8	44.4
	35-44	6	33.3
	45-54	3	16.7
	Above 54	0	0
Educational Level	Diploma	3	16.7
	Degree	14	77.8
	MA/MSC	1	5.6
Position	Expert	5	27.8
	senior expert	7	38.9
	middle level manager	4	22.2
	top level manager	2	11.1
Work Experience	1-5 Years	6	33.3
	6-10 Years	7	38.9
	11-15 Years	5	27.8

Source: (Field survey, 2017)

The above table indicates that the age of 1(5.6%) is less than 25 years, the age of 8 (44.4%) is b/n 26 and 34 years, the age of 6(33.3%) is b/n 35 and 44 years and the remaining 3(16.7%) is b/n 45 and 54 years old. These indicate that the age of the majority expert respondents is b/n 26 and 44 years which is the most known energetic and well-motivated age group for work to minimize problems in the work process so as to bring change in sectors.

Educational level is the most important factor in experts' perception of the supply chain management process. In the study area, expert respondents showed differences in their educational levels. As table 4.1 indicates the majority of the experts among the 14 are degree holders (77.8%), 3 are Diploma holders (16.7%) and the remaining 1(5.6%) are MA/MSC holders. This means all of the experts involved directly or indirectly in the SCM are well educated which helps to enable them to know everything in detail without the need of basic support from others.

As table 4.1 indicates, 5(27.8%) of the respondents were experts, 7(38.9%) were senior experts, 4(22.2%) of the respondents were middle level management and the remaining 2(11.1%) of the respondents were Top level management. This implies that the majority were able with adequate designation authority. Thus, it is clear that the experienced and educated respondents could understand the problems in SCM related activities and give sufficient and correct information that could contribute through the validity of this study. When we see the experience of experts for the SCM, the majority 12(66.7%) are above 5 years and the remaining 6(33.3%) are b/n 1-5 years. This indicates that the majority of the experts were present in the process of SCM were well experienced.

Table 4. 2 Demographic Characteristics of Consultants

Characteristics		**Frequency**	**Percentage**
Age	< 25	0	0
	26-34	3	15.0
	35-44	15	75.0
	45-54	2	10.0
	Above 54		0
Educational Level	Certificate	0	0
	Diploma	0	
	Degree	15	75.0
	MA/MSC	5	25.0
Work Experience	1-5 Years	3	15.0
	6-10 Years	7	35
	11-15 Years	10	50

Source: (Field survey, 2017)

The above table indicates that the age of 3(15%) is between 26 and 34 years, the age of 15 (75%) is between 35 and 44 years, and the age of 2 (10%) is between 45 and 54 years old. These indicate that the age of the majority respondents from consultant is between 35 and 44 years.

Educational level is the most important factor in supply chain management practices. In the study area, expert respondents showed differences in their educational levels. As table 4.2 indicates the majority of the experts among the 15 are degree holders (75%), and the remaining 5(25%) are MA/MSC holders. This means all consultants involved directly or indirectly in the SCM are well educated which helps to enable them to know everything in detail without the need of basic support from others. When we see the experience of consultants for the SCM, the majority 17(85%) are above 5 years and the remaining 3(15%) are b/n 1-5 years. This indicates that the majority of the respondents from consultant side were well experienced.

Table 4. 3Demographic Characteristics of Contractors

Characteristics		**Frequency**	**Percentage**
Age	< 25	35	20.3
	26-34	132	76.7
	35-44	5	2.9
	45-54		
	Above 54		
Educational Level	Certificate	0	0
	Diploma	25	14.5
	Degree	111	64.5
	MA/MSC	36	20.9
Work Experience	1-5 Years	5	2.9
	6-10 Years	11	6.4
	11-15 Years	151	87.8
	Over 15 Years	5	2.9

Source: (Field survey, 2017)

As indicated in table 4.3, the age of 35(20.3%) contractor respondents involved in the study is less than 25 years, the age of 132(76.7%) is b/n 26 and 34 years and the remaining 5(2.9%) is b/n 35 and 44 years old. These indicate that the age of the majority contractor respondents involved in the study is b/n 26 and 34 years which is the most known energetic and well-motivated age group.

As described in the table above, none of the contractors are Certificate level in their educational status, 25(14.5%) of the contractors are diploma level in their educational status, 111(64.5%) of the contractors are degree level in their educational status and the remaining 36(20%) are MA/MSC level in their educational status. Here, one can understand that majority of contractors are well educated.

In relation to their work experience status, the work experience of contractor respondents the majority 167(97.1%) are above 5 years and the remaining 5(2.9%) are b/n 1-5 years. This indicates that the majority of the experts from contractor side were well experienced.

4.4 The factors that affecting the SCM process

According to Henry, Rado, and Scarlett. (2012), the critical factors affecting the performance of construction supply chains are: following the organization's procedures in dealing with CSCM; information sharing; supply chain technical background; support from upper management; understanding the SCM environment (retailers, manufacturer, raw materials); and supporting the objectives of the related production system. Greater awareness of the importance of these factors may lead to successful SCM implementation in the future.

SCM constraint related questions are classified into five categories: according to challenges related with the critical factors affecting the performance of construction supply chains are: information sharing; supply chain technical background; support from top management; understanding the SCM environment (retailers, manufacturer, raw materials); and supporting the objectives of the related production system.

A) Information sharing

Information sharing allows firms to make better decisions on ordering, capacity allocations, production and material planning (Cheng,), through increased visibility of demand, supply and inventory (Ding, Guo and Liu,)

.

Table 4. 4 Information sharing on SCM

No	Choices	Scale	PO		Contractors		Consultants		Mean
			Frequency	Percentile	Frequency	Percentile	Frequency	Percentile	
1	The project office has no awareness about malicious logic on hardware or software to our supplier communications.	Strongly Disagree	5	27.8	75	43.6	6	30.0	1.95
		Disagree	7	38.9	65	37.8	11	55.0	
		Neutral	5	27.8	19	11.0			
		Agree	1	5.6	11	6.4	3	15.0	
		Strongly Agree	0	0	2	1.2	0	0	
2	The project office have no shaped external communication exists (e.g. with suppliers, contractors and clients) and contributes to high quality outcomes.	Strongly Disagree	0	0	12	7.0	2	10.0	3.3
		Disagree	7	38.9	32	18.6	2	10.0	
		Neutral	0	0	30	17.4	3	15.0	
		Agree	10	55.6	87	50.6	13	65.0	
		Strongly Agree	1	5.6	11	6.4	0	0	
3	Internal communication processes between procurement, materials management, contract administration, design department and amongst its staffs, have not well defined communication as it is.	Strongly Disagree	0	0	19	11.0	2	10.0	3.3
		Disagree	5	27.8	38	22.1	3	15.0	
		Neutral	2	11.1	30	17.4	5	25.0	
		Agree	10	55.6	65	37.8	10	50.0	
		Strongly Agree	1	5.6	20	11.6	0	0	

Source: (Field survey, 2017)

As shown in the table 4.4a, 5(27.8%) of the PO experts, 75(43.6%) of the contractors and 6(15%) of the consultant were strongly disagreed as the project office has no awareness about malicious logic on hardware or software to our supplier communications, 7(38.9%)of the PO experts, 65(37.8%) of the contractors and 11(55%) of the consultant were disagree, 5(27.8%)of the PO experts, 19(11%) of the contractors and none of the consultant were neutral, 1(5.6%)of the PO experts, 11(6.4%) of the contractors and 3(15%) of the consultant were agree and the remaining 2(1.2%) of the contractors respondents were strongly agree as the project office has no awareness about malicious logic on hardware or software to our supplier communications.

According to table 4.4a, none of the PO experts, 12(7%) of the contractors and 2(10%) of the consultant strongly disagreed as the project office have no shaped external communication exists with suppliers, contractors and clients, 7(38.9%)of the PO experts, 32(18.6%) of the contractors and 2(10%) of the consultant were disagree, none of the PO experts, 30(17.4%) of the contractors and 13(65%) of the consultant neutral, 10(55.6%) of the PO experts, 87(50.6%) of the contractors and 3(15%) of the consultant were agree and the remaining 1(5.6%) of the PO experts, 11(6.4%) of the contractors respondents were strongly agree as the project office have no shaped external communication exists with suppliers, contractors and clients.

As shown in the table 4.4a, none of the PO experts, 19(11%) of the contractors and 2(10%) of the consultant strongly disagreed as internal communication processes between procurement, materials management, contract administration, design department and amongst its staffs, have not well defined communication., 5(27.8%)of the PO experts, 38(22.1%) of the contractors and 3(15%) of the consultant were disagree, 2(11.1%) of the PO experts, 30(17.4%) of the contractors and 5(25%) of the consultant neutral, 10(55.6%) of the PO experts, 65(37.8%) of the contractors and 10(50%) of the consultant were agree and the remaining 1(5.6%) of the PO experts and 20(11.6%) of the contractors respondents were strongly agree as internal communication processes between procurement, materials management, contract administration, design department and amongst its staffs, have not well defined communication.

Thus the project office has no awareness about malicious logic on hardware or software to our supplier communications as shown by a mean of 1.95, the project office has no shaped external communication exists with suppliers, contractors and clients as shown by a mean of 3.3 and internal communication processes between procurement, materials management, contract administration, design department and amongst its staffs, have not well defined communication as shown by a mean of 3.3. The high mean indicates that information sharing system of PO hampering the operations of SCM. The mean value 3 and greater indicated the PO have high constraints of SCM system, mean value greater than 2 and less than 3 indicate moderate, mean value less than 2 indicate low constraints of SCM related with information sharing system. This indicates that shaped external communication exists with suppliers, contractors and clients and internal communication processes between procurement, materials management, contract administration, design department and amongst its staffs are highly affect the SCM process. From this one can understand that in PO shaped external

communication exists with suppliers, contractors and clients and internal communication processes between procurement, materials management, contract administration, design department and amongst its staffs is constraints to SCM. However, the constraints of awareness about malicious logic on hardware or software to the supplier communications are low on SCM process.

B) Supply chain technical background

Ross (2000) identified the complexities in defining supply chain technical background, recognizing that the concept involves a matrix of applications and can be defined in various ways. He viewed supply chain technical background as a comprehensive, dynamic, growth-oriented, competitive management approach that is nurtured by globalization, change and uncertainty.

Table 4.5 Supply chain technical background

No	Choices	Scale	PO		Contractors		Consultants		Mean
			Frequency	Percentile	Frequency	Percentile	Frequency	Percentile	
1	Lack of supply chain technical know-how	Strongly Disagree	0	0	11	6.4	0	0	3.45
		Disagree	4	22.2	27	15.7	0	0	
		Neutral	3	16.7	26	15.1	6	30.0	
		Agree	10	55.6	84	48.8	13	65.0	
		Strongly Agree	1	5.6	24	14.0	1	5.0	
2	There is still have lack of coordination mechanism on project Activity duration	Strongly Disagree	3	16.7	13	7.6			3.45
		Disagree	5	27.8	30	17.4	3	15.0	
		Neutral	0	0	16	9.3	2	10.0	
		Agree	9	50.0	85	49.4	10	50.0	
		Strongly Agree	1	5.6	28	16.3	5	25.0	

Source: (Field survey, 2017)

According to table 4.4b, none of the PO experts and consultant and 11(6.4%) of the contractors respondent were strongly disagreed as lack of supply chain technical know-how, 4(22.2%) of the PO experts, 27(15.7%) of the contractors and none of the consultant were disagree, 3(16.7%) of the PO experts, 26(15.1%) of the contractors and 6(30%) of the consultant were neutral, 10(55.6%) of the PO experts, 84(48.8%) of the contractors and 13(65%) of the consultant were agree and the remaining 1(5.6%) of the PO experts, 24(14%) of the contractors and 1(5%) of the consultant were strongly agree as lack of supply chain technical know-how.

As shown in the table 4.4b, 3(16.7%) of the PO experts, 13(7.6%) of the contractors and none of the consultant strongly disagreed as there is still have lack of coordination mechanism on project Activity duration, 5(27.8%)of the PO experts, 30(17.4%) of the contractors and 3(15%) of the consultant were disagree, none of the PO experts, 16(9.3%) of the contractors 2(10%) of the consultant were neutral, 9(50%) of the PO experts, 85(49.4%) of the contractors and 10(50%)of the consultant were agree and the remaining 1(5.6%) of the PO experts 28(16.3%)of the contractors and 5(25%) of respondents were strongly agree as there is still have lack of coordination mechanism on project Activity duration.

As summarized on the table 4.4b lack of supply chain technical know-how and there is still have lack of coordination mechanism on project Activity duration as shown by a mean of 3.45. the mean value 2 and less indicates that low rate of lack of supply chain technical know-how and there is still have lack of coordination mechanism on project Activity duration, the mean value between 2 and 3 indicates moderate rate of lack of supply chain technical know-how and have lack of coordination mechanism on project activity duration and the mean value greater than 3 indicates high rate of lack of supply chain technical know-how and there is still have lack of coordination mechanism on project Activity duration. This implies that there is lack of supply chain technical know-how and coordination mechanism on project Activity duration in the three sectors (consultant, PO and contractors).

C) Understanding the SCM environment

UN-HABITAT (2011) stated that understanding the SCM environment (retailers, manufacturer, raw materials) is based on the following three dynamics: Operations management techniques where all the organizations' functions – marketing, manufacturing and finance – are optimally utilized and integrated to form the common business system. These techniques offer competitive advantage by adding value to the day-to-day performance of regular activities. The three sets of activities are inbound logistics, processing activities and support activities. Integrated logistics management is extended to the interchange logistics activities. The objective at this level is to interface closely with, not merge, the identical functions performed by logistics counterparts in outside supply channel partners. The main rationale of this dynamic process is that an organization needs support from its internal as well as external supply chain partners to gain competitive advantage and market leadership.

Table 4.6 Understanding the SCM environment

No	Choices	Scale	PO		Contractors		Consultants		Mean
			Frequency	Percentile	Frequency	Percentile	Frequency	Percentile	
1	Construction materials requirement Plans are not complete and details are missing	Strongly Disagree			16	9.3	3	15.0	3.5
		Disagree	4	22.2	36	20.9			
		Neutral	2	11.1	20	11.6	2	10.0	
		Agree	11	61.1	70	40.7	11	55.0	
		Strongly Agree	1	5.6	30	17.4	4	20.0	
2	Procurement of construction materials takes a long time	Strongly Disagree	4	22.2	10	5.8	1	5.0	3.82
		Disagree	0	0	13	7.6			
		Neutral	2	11.1	37	21.5	5	25.0	
		Agree	11	61.1	63	36.6	7	35.0	
		Strongly Agree	1	5.6	49	28.5	7	35.0	
3	Local suppliers have limited capacity	Strongly Disagree	0	0	13	7.6	2	10.0	3.52
		Disagree	4	22.2	14	8.1	1	5.0	
		Neutral	1	5.6	50	29.1			
		Agree	12	66.7	71	41.3	12	60.0	
		Strongly Agree	1	5.6	24	14.0	5	25.0	
4	Construction material supply are not managed as a process and has Long period for approval of tests and inspections	Strongly Disagree	0	0	9	5.2	1	5.0	3.81
		Disagree	4	22.2	14	8.1	1	5.0	
		Neutral	2	11.1	22	12.8			
		Agree	8	44.4	87	50.6	13	65.0	
		Strongly Agree	4	22.2	40	23.3	5	25.0	
5	Changed design and material specification is basic factor for material wastage and increment of project costs	Strongly Disagree	0	0	10	5.8	1	5.0	3.69
		Disagree	4	22.2	23	13.4	2	10.0	
		Neutral	0	0	50	29.1	4	20.0	
		Agree	10	55.6	57	33.1	5	25.0	
		Strongly Agree	4	22.2	32	18.6	8	40.0	
6	Difficulties related to the management of stock	Strongly Disagree			16	9.3	1	5.0	3.91
		Disagree			18	10.5	1	5.0	
		Neutral	2	11.1	28	16.3			
		Agree	11	61.1	76	44.2	13	65.0	
		Strongly Agree	5	27.8	34	19.8	5	25.0	
7	We have no developed strategy yet on supply-chain-management related wide technology.	Strongly Disagree	0	0	4	2.3	1	5.0	3.74
		Disagree	3	16.7	24	14.0	1	5.0	
		Neutral	0 0		24	14.0			
		Agree	9	50.0	101	58.7	13	65.0	
		Strongly Agree	6	33.3	19	11.0	5	25.0	

Source: (Field survey, 2017)

According to table 4.4c, none of PO, 9.3% of contractors and 15% of consultant respondents were strongly disagreed as Construction materials requirement Plans are not complete and details are missing, 22.2% of PO, 20.9% of contractors and none of consultant respondents were disagree, 11.1% of PO, 11.6% of contractors and 10% of consultant respondents were neutral, 61.1% of PO, 40.7% of contractors and 55% of consultant respondents were agreed and the remaining 5.6% of PO, 17.4% of contractors and 20% of consultant respondents were strongly agreed.

As shown in the table 4.4c, 22.2% of PO, 5.8% of contractors and 5% of consultant respondents were strongly disagreed as Procurement of construction materials takes a long time, none of PO, 7.6% of contractors and none of consultant respondents were disagree, 11.1% of PO, 21.5% of contractors and 25% of consultant respondents were neutral, 61.1% of PO, 36.6% of contractors and 35% of consultant respondents were agreed and the remaining 5.6% of PO, 28.5% of contractors and 35% of consultant respondents were strongly agreed.

According to table 4.4c, none of PO, 7.6% of contractors and 10% of consultant respondents were strongly disagreed as Local suppliers have limited capacity, 22.2% of PO, 8.1% of contractors and 5% of consultant respondents were disagree, 5.6% of PO, 29.1% of contractors and none of consultant respondents were neutral, 66.7% of PO, 41.3% of contractors and 60% of consultant respondents were agreed and the remaining 5.6% of PO, 14% of contractors and 25% of consultant respondents were strongly agreed.

As summarized in the table 4.4c, none of PO, 5.2% of contractors and 5% of consultant respondents were strongly disagreed as Construction material supply are not managed as a process and has Long period for approval of tests and inspections, 22.2% of PO, 8.1% of contractors and 5% of consultant respondents were disagree, 11.1% of PO, 12.8% of contractors and none of consultant respondents were neutral, 44.4% of PO, 50.6% of contractors and 65% of consultant respondents were agreed and the remaining 22.2% of PO, 23.3% of contractors and 25% of consultant respondents were strongly agreed.

As indicated in the table 4.4c, none of PO, 5.8% of contractors and 5% of consultant respondents were strongly disagreed as Changed design and material specification is basic factor for material wastage and increment of project costs, 22.2% of PO, 13.4% of contractors and 10% of consultant respondents were disagree, none of PO, 29.1% of

contractors and 20% of consultant respondents were neutral, 55.6% of PO, 33.1% of contractors and 25% of consultant respondents were agreed and the remaining 22.2% of PO, 18.6% of contractors and 40% of consultant respondents were strongly agreed.

As indicated in the table 4.4c, none of PO, 9.3% of contractors and 5% of consultant respondents were strongly disagreed as Difficulties related to the management of stock, none of PO, 10.5% of contractors and 5% of consultant respondents were disagree, 11.1% of PO, 16.3% of contractors and none of consultant respondents were neutral, 61.1% of PO, 44.2% of contractors and 65% of consultant respondents were agreed and the remaining 27.8% of PO, 19.8% of contractors and 25% of consultant respondents were strongly agreed.

As indicated in the table 4.4c, none of PO, 2.3% of contractors and 5% of consultant respondents were strongly disagreed as We have no developed strategy yet on supply-chain-management related wide technology, 16.7% of PO, 14% of contractors and 5% of consultant respondents were disagree, none of PO, 14% of contractors and none of consultant respondents were neutral, 50% of PO, 58.7% of contractors and 65% of consultant respondents were agreed and the remaining 33.3% of PO, 11% of contractors and 25% of consultant respondents were strongly agreed.

The percent and mean of various indicators shown in table 4.4C indicated that the Construction materials requirement Plans are not complete and details are missing, 66.7% (sum of agree and strongly agree) the respondents from PO, 58.1%(sum of agree and strongly agree) from contractors and 75% (sum of agree and strongly agree) the respondents from consultant which had a mean of 3.5, 66.7% (sum of agree and strongly agree) the respondents from PO, 65.1%(sum of agree and strongly agree) from contractors and 70% (sum of agree and strongly agree) the respondents from consultant indicated the Procurement of construction materials takes a long time as shown by a mean of 3.82. From 72.3% (sum of agree and strongly agree) the respondents from PO, 55.3 %(sum of agree and strongly agree) from contractors and 85% (sum of agree and strongly agree) the respondents from consultant indicated, Local suppliers have limited capacity, mean of 3.52. The respondents also agreed that Construction material supply are not managed as a process and has Long period for approval of tests and inspections, from 66.6% (sum of agree and strongly agree) the respondents from PO, 73.9%(sum of agree and strongly

agree) from contractors and 90% (sum of agree and strongly agree) the respondents from consultant, as shown by a mean of 3.81. From 77.8% (sum of agree and strongly agree) the respondents from PO, 51.7%(sum of agree and strongly agree) from contractors and 65% (sum of agree and strongly agree) the respondents from consultant Changed design and material specification is basic factor for material wastage and increment of project costs as shown by mean of 3.69. The respondents also agreed that difficulties related to the management of stock, from 88.9% (sum of agree and strongly agree) the respondents from PO, 64%(sum of agree and strongly agree) from contractors and 90% (sum of agree and strongly agree) the respondents from consultant, as shown by a mean of 3.91. From 83.3% (sum of agree and strongly agree) the respondents from PO, 69.7 %(sum of agree and strongly agree) from contractors and 90% (sum of agree and strongly agree) the respondents from consultant No developed strategy yet on supply chain management related wide technology as shown by mean of 3.74. The mean value 2 and less indicated that there is Understanding the SCM environment, mean value greater than 2 and less than 3 indicate moderate Understanding on the SCM environment and mean value greater than 3 indicate that there is a problem on Understanding the SCM environment or low Understanding on SCM environment. As summarized in the table 4.4C all variables have the highest mean value which is greater than 3 indicates that as the respondents Construction materials requirement Plans are not complete and details are missing, Procurement of construction materials takes a long time, local suppliers have limited capacity, Construction material supply are not managed as a process and has Long period for approval of tests and inspections, Changed design and material specification is basic factor for material wastage and increment of project costs, Difficulties related to the management of stock and have no developed strategy yet on supply-chain-management related wide technology

D) SCM supporting the objectives of the related operation system

(Burt, Dobler, and Starling, 2003) argued that all supporting the objectives of the related operation system of a supply chain should further concentrate on a series of value-adding functions:

- **Quality** – should relate to Total Quality Management (TQM) to offer the best possible product and service given the market segment;
- **Cost** – should focus on strategic cost management programs by reducing the total cost throughout the chain;

- **Time** – aim at reducing lead-time so products and services are available to the end users in the minimum possible time;
- **Technology** – should be used appropriately both internally and externally with the members of supply chain to gain competitive advantages; and
- **Continuity of supply** – develop appropriate supplier relationships by monitoring the trends in the chain and marketplace.

Table 4.7 SCM supporting the objectives

No	Choices	Scale	PO		Contractors		Consultants		Mean
			Frequency	Percentile	Frequency	Percentile	Frequency	Percentile	
1	The office is not fully used technology appropriately both internally and externally with the members of supply chain.	Strongly Disagree	0	0	19	11.0			3.6
		Disagree	4	22.2	25	14.5	1	5.0	
		Neutral	1	5.6	28	16.3	2	10.0	
		Agree	9	50.0	76	44.2	2	10.0	
		Strongly Agree	4	22.2	24	14.0	10	50.0	
2	Current procedures practiced in the constructions logistics could not protected construction inputs from damage during construction and delivery.	Strongly Disagree			17	9.9	3	15.0	3.45
		Disagree	2	11.1	16	9.3	2	10.0	
		Neutral	3	16.7	50	29.1	4	20.0	
		Agree	9	50.0	71	41.3	10	50.0	
		Strongly Agree	4	22.2	18	10.5	1	5.0	
3	The organization has no a system in place to manage both cost and time.	Strongly Disagree			18	10.5	1	5	3.18
		Disagree	6	33.3	38	22.1	2	10.0	
		Neutral	3	16.7	54	31.4	4	20.0	
		Agree	5	27.8	49	28.5	10	50.0	
		Strongly Agree	4	22.2	13	7.6	3	15.0	

Source: (Field survey, 2017)

According to table 4.4a, none of PO experts and consultants and 11% of the contractors respondents were strongly agree as the office is not fully used technology appropriately both internally and externally with the members of supply chain 4(22.2%)of the PO experts, 25(14.5%) of the contractors and (5%) of the consultant disagreed, 1(5.6%) of the

PO experts, 28(16.3%) of the contractors and 2(10%) of the consultant were neutral, 9(50%) of the PO experts, 76(44.2%) of the contractors and 2(10%) of the consultant were agree and 4(22.2%) PO experts, 24(14%) of the contractors and 10(50%)of the consultant were strongly agree.

As shown in the table 4.4d, none of the PO experts, 17(9.9%) of the contractors and 3(15%) of the consultant strongly disagreed as Current procedures practiced in the constructions logistics could not protected construction inputs from damage during construction and delivery, 2(11.1%)of the PO experts, 16(9.3%) of the contractors and 2(10%) of the consultant were disagree, 3(16.7%)of the PO experts, 50(29.1%) of the contractors and 4(20%) of the consultant were neutral, 9(50%)of the PO experts, 71(41.3%) of the contractors and 10(50%) of the consultant were agree and the remaining 4(22.2%) of the PO experts, 18(10.5%) of the contractors and 1(5%) of the consultant were contractors respondents were strongly agree.

According to table 4.4d, none of the PO experts, 18(10.5%) of the contractors and 1(5%) of the consultant strongly disagreed as The organization has no a system in place to manage both cost and time, 6(33.3%)of the PO experts, 38(22.1%) of the contractors and 2(10%) of the consultant were disagree, 3(16.7) of the PO experts, 54(31.4%) of the contractors and 4(20%) of the consultant neutral, 5(27.8%) of the PO experts, 49(28.5%) of the contractors and 10(50%) of the consultant were agree and the remaining 4(22.2%) of the PO experts, 13(7.6%) of the contractors and 3(15%) of the consultant respondents were strongly agree.

The percent and mean of various indicators shown in table 4.4d indicated that the office is not fully used technology appropriately both internally and externally with the members of supply chain 77.2% (sum of agree and strongly agree) the respondents from PO, 58.2%(sum of agree and strongly agree) from contractors and 60% (sum of agree and strongly agree) the respondents from consultant which had a mean of 3.6 77.2% (sum of agree and strongly agree) the respondents from PO, 51.8%(sum of agree and strongly agree) from contractors and 55% (sum of agree and strongly agree) the respondents from consultant indicated the Current procedures practiced in the constructions logistics could not protected construction inputs from damage during construction and delivery as shown by a mean of 3.45. From 50% (sum of agree and strongly agree) the respondents from PO, 36.1% (sum of agree and strongly agree) from contractors and 65% (sum of agree and strongly agree) the respondents from consultant indicated, the organization has no a system in place to manage both cost and time, mean of 3.18. The mean value 2 and less indicated that there is high operation system to support the objectives of SCM, mean value greater than 2 and less than 3 indicate moderate there is moderate operation system to support the objectives of SCM, and mean value greater

than 3 indicate that there is problems on operation system to support the objectives of SCM or low operation system to support the objectives of SCM. As summarized in the table 4.4d all variables have the highest mean value which is greater than 3 indicates that as the respondents the operation system to support the objectives of SCM is low meaning the project office is not fully used technology appropriately both internally and externally with the members of supply chain, current procedures practiced in the constructions logistics could not protected construction inputs from damage during construction and delivery and the organization has no a system in place to manage both cost and time

E) Support from top management

Management support is critical in SCM (Van Hoek, R. I., Chatham, R., Wilding, R, 2002). Dinter (2012) shared the same view that top management support is vital for strategy success.

Table 4.8 Support from top management

No	Choices	Scale	PO		Contractors		Consultants		Mean
			Frequency	Percentile	Frequency	Percentile	Frequency	Percentile	
1	The top management is not establishing unity of purpose and direction of the company to managing the supply chain.	Strongly Disagree	1	5.6	18	10.5	1	5.0	3.48
		Disagree	6	33.3	23	13.4	1	5.0	
		Neutral	1	5.6	39	22.7	1	5.0	
		Agree	9	50.0	76	44.2	11	55.0	
		Strongly Agree	1	5.6	16	9.3	6	30.0	
2	Employees are not fully involved and their abilities are not empowered for the company's benefit.	Strongly Disagree	0	0	11	6.4	1	5.0	3.46
		Disagree	6	33.3	29	16.9	2	10.0	
		Neutral	1	5.6	45	26.2	5	25.0	
		Agree	9	50.0	66	38.4	7	35.0	
		Strongly Agree	2	11.1	21	12.2	5	25.0	
3	The development of human resources, teamwork, and employee commitment are not concerns people.	Strongly Disagree	1	5.6	4	2.3	1	5.0	3.81
		Disagree	4	22.2	10	5.8			
		Neutral	4	22.2	20	11.6	1	5.0	
		Agree	7	38.9	75	43.6	12	60.0	
		Strongly Agree	2	11.1	63	36.6	6	30.0	

Source: (Field survey, 2017)

According to table 4.4e, 1(5.6%) of the PO experts, 18(10.5%) of the contractors and 1(5%) of the consultant respondents were strongly disagree as the top management is not establishing unity of purpose and direction of the company to managing the supply chain. 6(33.3%)of the PO experts, 23(13.4%) of the contractors and 1(5%) of the consultant were disagreed, 1(5.6%) of the PO experts, 39(22.7%) of the contractors and 1(5%) of the consultant were neutral, 9(50%) of the PO experts, 76(44.2%) of the contractors and 11(55%) of the consultant were agree and 1(5.6%) PO experts, 16(9.3%) of the contractors and 6(30%) of the consultant were strongly agree.

As shown in the table 4.4e, none of the PO experts, 11(6.4%) of the contractors and 1(5%) of the consultant strongly disagreed as employees are not fully involved and their abilities are not empowered for the company's benefit, 6(33.3%)of the PO experts, 29(16.9%) of the contractors and 2(10%) of the consultant were disagree, 1(5.6%)of the PO experts, 45(26.2%) of the contractors and 5(25%) of the consultant were neutral, 9(50%)of the PO experts, 66(38.4%) of the contractors and 7(35%) of the consultant were agree and the remaining 2(11.1%) of the PO experts, 21(12.2%) of the contractors and 5(25%) of the consultant were contractors respondents were strongly agree.

According to table 4.4e, 1(5.6%) of the PO experts, 4(2.3%) of the contractors and 1(5%) of the consultant strongly disagreed as the development of human resources, teamwork, and employee commitment are not concerns people, 4(22.2%)of the PO experts, 10(5.8%) of the contractors and none of the consultant were disagree, 4(22.2%) of the PO experts, 20(11.6%) of the contractors and 1(5%) of the consultant neutral, 7(38.9%) of the PO experts, 75(43.6%) of the contractors and 12(60%) of the consultant were agree and the remaining 2(11.1%) of the PO experts, 63(36.6%) of the contractors and 6(30%) of the consultant respondents were strongly agree.

The percent and mean of various indicators shown in table 4.4e indicated that the top management is not establishing unity of purpose and direction of the company to managing the supply chain, 55.6% (sum of agree and strongly agree) the respondents from PO, 53.5%(sum of agree and strongly agree) from contractors and 85% (sum of agree and strongly agree) the respondents from consultant which had a mean of 3.48 61.1% (sum of agree and strongly agree) the respondents from PO, 50.6%(sum of agree and strongly agree) from contractors and 60% (sum of agree and strongly agree) the respondents from

consultant indicated Employees are not fully involved and their abilities are not empowered for the company's benefit as shown by a mean of 3.46. From 50% (sum of agree and strongly agree) the respondents from PO, 80.2% (sum of agree and strongly agree) from contractors and 90% (sum of agree and strongly agree) the respondents from consultant indicated, the development of human resources, teamwork, and employee commitment are not concerns people, mean of 3.81. The mean value 2 and less indicated that there is high support of top management on SCM, mean value greater than 2 and less than 3 indicate moderate support, and mean value greater than 3 indicate that there is low support of top management on SCM. As summarized in the table 4.4e all variables have the highest mean value which is greater than 3 indicates that as the respondents the top management support on SCM is low or there is no sufficient supports from top management on SCM meaning as the respondent the top management is not establishing unity of purpose and direction of the company to managing the supply chain, the development of human resources, teamwork, and employee commitment are not concerns people and employees are not fully involved and their abilities are not empowered for the company's benefit.

F) Understanding SCM environment with regard to its establishment and fulfilling the objectives of the construction project system

The construction industry is extremely fragmented in many countries with problems including the separation of design and construction, lack of coordination and integration between the various functional disciplines and poor communication. The end result for clients of the construction industry is dissatisfaction with outcomes in many cases and higher costs than necessary. Traditional management approaches tend to dominate the construction industry, unlike the manufacturing industry, with little awareness of alternatives that might lead to better outcomes (GTZ-IS/ Ethiopia, 2015). Firstly, the focus can be on the impacts of the supply chain (SC) on site activities.

The goal is to reduce the costs and duration of site activities. In this case, the primary consideration is to ensure dependable material flows to the site to avoid disruption to workflow.

Table 4.9 SCM environment with regard to its establishment

No	Choices	Scale	PO		Contractors		Consultants		Mean
			Frequency	Percentile	Frequency	Percentile	Frequency	Percentile	
1	An organizational structure of PO supports the supply chain management system	Strongly Disagree	7	38.9	58	33.7	7	35	1.95
		Disagree	6	33.3	62	36	11	55	
		Neutral	4	22.2	39	22.7	2	10	
		Agree	0	0	5	2.9	0	0	
		Strongly Agree	1	5.6	8	4.7	0	0	
2	In order to improve programs the project office's establish a permanent and sustainable strategic goal	Strongly Disagree	5	27.8	60	34.9	7	35	1.98
		Disagree	8	44.4	71	41.3	7	35	
		Neutral	5	27.8	31	18	6	30	
		Agree	0	0	4	2.3	0	0	
		Strongly Agree	0	0	6	3.5	0	0	
3	Internal and external supply chain members fully utilize appropriate technology.	Strongly Disagree	6	33.3	59	34.3	8	40	1.94
		Disagree	8	44.4	60	34.9	8	40	
		Neutral	4	22.2	34	19.8	4	20	
		Agree	0	0	8	4.7	0	0	
		Strongly Agree	0	0	11	6.4	0	0	
4	In the area where construction of logistics is currently undergoing a system of handover properties regarding warehouses the storage of construction inputs protected from damage or stolen.	Strongly Disagree	7	38.9	56	32.6	7	35	1.95
		Disagree	7	38.9	65	37.8	9	45	
		Neutral	4	22.2	39	22.7	3	15	
		Agree	0	0	5	2.7	0	0	
		Strongly Agree	0	0	7	4.1	1	5	
5	The project office has a system in place to manage both cost and time.	Strongly Disagree	6	33.3	60	34.9	6	30	1.96
		Disagree	7	38.9	69	40.1	9	45	
		Neutral	5	27.8	32	18.6	5	25	
		Agree	0	0	6	3.5	0	0	
		Strongly Agree	0	0	5	2.9	0	0	
6	Top management bodies /Authorities/ has a conceptual knowledge about how to deal with the art of supply chain management.	Strongly Disagree	7	38.9	60	34.9	7	35	1.96
		Disagree	6	33.3	68	39.5	9	45	
		Neutral	4	22.2	35	20.3	3	15	
		Agree	1	5.6	6	3.5	0	0	
		Strongly Agree	0	0	3	1.7	1	5	
7	In order to have an effective and efficient supply chain a practical and unified direction created by the top management.	Strongly Disagree	6	33.3	57	33.1	7	35	2
		Disagree	7	38.9	65	37.8	7	35	
		Neutral	4	22.2	42	24.4	5	25	
		Agree	1	5.6	4	2.3	0	0	
		Strongly Agree	0	0	4	2.3	1	5	

No	Choices	Scale	PO		Contractors		Consultants		Mean
			Frequency	Percentile	Frequency	Percentile	Frequency	Percentile	
8	A favorable conditions created for the employees to enable them maximize their capacity and knowledge.	Strongly Disagree	7	38.9	59	34.3	6	30	1.99
		Disagree	8	44.4	70	40.7	7	35	
		Neutral	3	16.7	33	19.2	5	25	
		Agree	0	0	5	2.9	1	5	
		Strongly Agree	0	0	5	2.9	1	5	
9	The project office implements a strategic objective for permanent and continuous improvement of overall SC performance	Strongly Disagree	6	33.3	61	35.5	7	35	1.92
		Disagree	8	44.4	63	36.6	9	45	
		Neutral	4	22.2	35	20.3	4	20	
		Agree	0	0	7	4.1	0	0	
		Strongly Agree	0	0	6	3.5	0	0	

Source: (Field survey, 2017)

According to table 4.5, 38.9% of PO, 35% of consultant and 33.7% of contractors respondents were strongly disagreed as an organizational structure of PO support the supply chain management system, 33.3% of PO, 55% of consultant and 36% of contractors respondents were disagree, 22.2% of PO, 22.7% of contractors and 10% of consultant respondents were neutral, none of PO and consultant and 2.9% of contractors respondents were agreed and the remaining 5.6% of PO, 4.7% of contractors and none of consultant respondents were strongly agreed.

As shown in the table 4.5, 27.8% of PO, 35% of consultant and 34.9% of contractors respondents were strongly disagreed as in general, in order to improve the project office's programs a permanent and sustainable strategic goal established/set/, 44.4% of the PO, 41.3% of contractors and 35% of the consultant respondents were disagree, 27.8% of the PO, 18% of contractors and 30% of consultant respondents were neutral, none of PO and consultant and 2.3% of contractors respondents were agreed and the remaining none of PO and consultant and 3.5% of contractors respondents were strongly agreed.

According to table 4.5, 33.3% of PO, 40% of consultant and 34.3% of contractors respondents were strongly disagreed as the project office internal and external supply chain members can fully utilize appropriate technology, 44.4% of the PO, 40% of consultant and 34.9% of contractors respondents were disagree, 22.2% of the PO, 19.8% of contractors and 20% of consultant respondents were neutral, none of the PO and consultant and 4.7% of contractors respondents were agreed and the remaining 6.4% of contractors respondents were strongly agreed.

As shown in the table 4.5, 38.9% of PO, 35% of consultant and 32.6% of contractors respondents were strongly disagreed as in the area where construction of logistics is currently undergoing a system of handover properties regarding warehouses the storage of construction inputs must be protected from damage or stolen, 38.9% of the PO, 45% of consultant and 37.8% of contractors respondents were disagree, 22.2 of PO, 22.7% of contractors and 15% of consultant respondents were neutral, none of the PO and consultant and 2.7% of contractors respondents were agreed and the remaining none of PO, 5% of consultant and 4.1% of contractors respondents were strongly agreed.

According to table 4.5, 33.3% of PO, 30% of consultant and 34.9% of contractors respondents were strongly disagreed as the project office has a system in place to manage both cost and time, 38.9% of the PO, 40.1% of contractors and 45% of consultant respondents were disagree, 27.8 of the PO, 18.6% of contractors and 25% of the consultant respondents were neutral, none of the PO and consultants and 3.5% of contractors respondents were agreed and none of the PO and consultants and 2.9% of contractors respondents were strongly agreed.

As summarized in the table 4.5, 38.9% of the PO, 34.9% of contractors and 35% of consultant respondents were strongly disagreed as top management bodies/Authorities/ has a conceptual knowledge how to deal with the art of supply chain management, 33.3% of the PO, 39.5% of contractors and 45% of consultant respondents were disagree, 22.2% of the PO, 20.3% of contractors and 15% of consultant respondents were neutral, 5.6% of the PO, 3.5% of contractors and none of consultant respondents were agreed and none of the PO, 1.7% of contractors and 5% of consultant respondents were strongly agreed as top management bodies/Authorities/ has a conceptual knowledge how to deal with the art of supply chain management.

As indicated in the table 4.5, 33.3% of PO, 35% consultant and 33.1% of contractors respondents were strongly disagreed as in order to have an effective and efficient supply chain a practical and unified direction created by the top management, 38.9% of PO, 35% of consultant and 37.8% of contractors respondents were disagree, 22.2% of the PO, 24.4% of contractors and 25% of the consultant respondents were neutral, 5.6% of the PO, 2.3% of contractors and none of consultant respondents were agreed and the remaining 2.3% of contractors and 5% of consultant respondents were strongly agreed that in order to have an effective and efficient supply chain a practical and unified direction created by the top management.

As indicated in the table 4.5, 38.9% of the PO, 30% consultant and 34.3% of contractors respondents were strongly disagreed as a favorable conditions created for the employees to enable them maximum capacity and knowledge, 44.4% of the PO, 35% of consultant and 40.7% of contractors respondents were disagree, 16.7% of the PO, 19.2% of contractors and 25% of consultant respondents were neutral, none of PO, 2.9% of contractors and 5% of consultant respondents were agreed and the remaining none of the PO, 2.9% of contractors and 5% of consultant respondents were strongly agreed.

As indicated in the table 4.5, 33.3% of the PO, 35.5% contractors and 35% of consultant respondents were strongly disagreed as the project office implements a strategic objective for permanent and continuous improvement of overall SC performance, 44.4% of the PO, 36.6% of contractors and 45% of consultant respondents were disagree, 22.2% of the PO, 20.3% of contractors and 20% of consultant respondents were neutral, none of the PO and consultants and 4.1% of contractors respondents were agreed and the remaining none of PO and consultants and 3.5% of contractors respondents were strongly agreed that the project office must be implementing a strategic objective for permanent and continuous improvement of overall SC performance.

The percent and mean of various indicators shown in table 4.5 indicated that an organizational structure of PO supports the supply chain management system 72.2% (sum of disagree and strongly disagree) respondents from PO, 69.7% (sum of disagree and strongly disagree) from contractors and 90% (sum of disagree and strongly disagree) respondents from consultant which had a mean of 1.95, 72.2% (sum of disagree and strongly disagree) respondents from PO, 76.2%(sum of disagree and strongly disagree) from contractors and 70% (sum of agree and strongly agree) respondents from consultant indicated in general, in order to improve the project office's programs a permanent and sustainable strategic goal as shown by a mean of 1.98, 77.7% (sum of disagree and strongly disagree) the respondents from PO, 69.2% (sum of disagree and strongly disagree) from contractors and 80% (sum of disagree and strongly disagree) respondents from consultant indicated, the project office must create a condition where internal and external supply chain members can fully utilize appropriate technology, mean of 1.94. The respondents also agreed that in the area where construction of logistics is currently undergoing a system of handover properties regarding warehouses the storage of construction inputs must be protected from damage or stolen, from 77.8% (sum of

disagree and strongly disagree) respondents from PO, 70.4%(sum of disagree and strongly disagree) from contractors and 80% (sum of disagree and strongly disagree) respondents from consultant, as shown by a mean of 1.95, 72.2% (sum of disagree and strongly disagree) the respondents from PO, 75% (sum of disagree and strongly disagree) from contractors and 75% (sum of disagree and strongly disagree) respondents from consultant the project office should have a system in place to manage both cost and time, as shown by mean of 1.96. The respondents also agreed that top management bodies/Authorities/ must have a conceptual knowledge how to deal with the art of supply chain management from 72.2% (sum of disagree and strongly disagree) the respondents from PO, 74.4%(sum of disagree and strongly disagree) from contractors and 80% (sum of disagree and strongly disagree) the respondents from consultant, as shown by a mean of 1.96, 72.2% (sum of disagree and strongly disagree) the respondents from PO, 70.9%(sum of disagree and strongly disagree) from contractors and 70% (sum of disagree and strongly disagree) respondents from consultant in order to have an effective and efficient supply chain a practical and unified direction must be created by the top management as shown by mean of 2. From 83.3% (sum of disagree and strongly disagree) respondents from PO, 75% (sum of disagree and strongly disagree) from contractors and 65% (sum of disagree and strongly disagree) respondents from a favorable conditions must be created for the employees to enable them do their to the maximum capacity and knowledge as shown by mean of 1.99.The respondents also agreed that the project office must be implementing a strategic objective for permanent and continuous improvement of overall SC performance, from 77.7% (sum of disagree and strongly disagree) the respondents from PO, 72.1%(sum of disagree and strongly disagree) from contractors and 80% (sum of disagree and strongly disagree) the respondents from consultant, as shown by a mean of 1.92. The mean value 2 and less indicates that the low level of understanding on the SCM environment with regard to its establishment and fulfilling the objectives of the construction project system. As indicated in the above table the mean value for all variables equals to and less than 2 and the majority of the respondents disagree that an organizational structure of PO can support the supply chain management system, in general, in order to improve the project office's programs a permanent and sustainable strategic goal must be established/set/, the project office create a condition where internal and external supply chain members can fully utilize appropriate technology, in the area where construction of logistics is currently undergoing a system of handover properties regarding warehouses the storage of

construction inputs must be protected from damage or stolen, the project office should have a system in place to manage both cost and time, top management bodies/Authorities/ must have a conceptual knowledge how to deal with the art of supply chain management, in order to have an effective and efficient supply chain a practical and unified direction created by the top management, a favorable conditions created for the employees to enable them do their to the maximum capacity and knowledge and the project office must be implementing a strategic objective for permanent and continuous improvement of overall SC performance. This indicates that as the respondent organizational structure of PO cannot support the supply chain management system, lack of permanent and sustainable strategic goal in order to improve the project office's programs, lack of a condition where internal and external supply chain members can fully utilize appropriate technology, lack of a system in place to manage both cost and time, top management bodies/Authorities/ lack of conceptual knowledge how to deal with the art of supply chain management and lack of favorable conditions created for the employees to enable them do their to the maximum capacity.

4.5 SCM Constraints Mitigation Strategies

Development of a set of propositions for improving construction supply chain management would be helpful to develop structured approaches between the construction companies and their contractors, resulting in better results for the entire supply chain. The proposition of these managerial practices also promotes a different discussion in terms of supply chain improvement in construction. First, these practices are focused on the strategic level, in which there is a lack of research. Second, the shift from an operational to a strategic view places supply chain improvement as a corporate matter that should be taken in consideration for strategic planning purposes.

Table 4.10 Mitigation Strategies on SCM Constraints

No	Choices	Scale	PO		Contractors		Consultants		Mean
			Frequency	Percentile	Frequency	Percentile	Frequency	Percentile	
1	The project office must create external communication systems that can enable to have a high quality outcome. (e.g. with suppliers, contractors and clients	Strongly Disagree	2	11.1	2	1.2	0	0	4.27
		Disagree	0	0	11	6.4	0	0	
		Neutral	5	27.8	20	11.6	3	15.0	
		Agree	11	61.1	61	35.5	9	45.0	
		Strongly Agree	0	0	78	45.3	8	40.0	

No	Choices	Scale	PO		Contractors		Consultants		Mean
			Frequency	Percentile	Frequency	Percentile	Frequency	Percentile	
2	The well internal communication processes between procurement, materials management, contract administration, design department and amongst its staffs, is contributes to better SCM process	Strongly Disagree	0	0	5	2.9	1	5.0	4.30
		Disagree	0	0	3	1.7	0	0	
		Neutral	3	16.7	17	9.9	1	5.0	
		Agree	5	27.8	70	40.7	8	40.0	
		Strongly Agree	10	55.6	77	44.8	10	50.0	
3	The establishment of an integrated platform for knowledge sharing can deliver substantial results for supply chain improvement	Strongly Disagree	0	0	5	2.9	1	5.0	4.1
		Disagree	5	27.8	6	3.5	0	0	
		Neutral	3	16.7	11	6.4	1	5.0	
		Agree	9	50.0	72	41.9	5	25.0	
		Strongly Agree	1	5.6	78	45.3	13	65.0	
4	Considering Suppliers' and Subcontractors' Development in SCM is used to obtain better results in terms of cost, quality, dependability, among others, from its suppliers	Strongly Disagree	1	5.6	5	2.9	1	5.0	4
		Disagree	2	11.1	6	3.5	0	0	
		Neutral	1	5.6	13	7.6	0	0	
		Agree	13	72.2	73	42.4	12	60.0	
		Strongly Agree	1	5.6	75	43.6	7	35.0	
5	The use of performance measurement systems proves to be crucial in order to face the current market competition	Strongly Disagree	0	0	5	2.9	1	5.0	4.14
		Disagree	0	0	6	3.5	0	0	
		Neutral	2	11.1	20	11.6	1	5.0	
		Agree	13	72.2	68	39.5	10	50.0	
		Strongly Agree	3	16.7	73	42.4	8	40.0	
6	The use of standardized metrics to assess the performance of suppliers and provide feedback for them is a powerful approach for supply chain management improvement	Strongly Disagree	0	0	11	6.4	0	0	3.89
		Disagree	2	11.1	15	8.7	1	5.0	
		Neutral	2	11.1	30	17.4	3	15.0	
		Agree	12	66.7	58	33.7	9	45.0	
		Strongly Agree	2	11.1	58	33.7	7	35.0	
7	Prepare an extensive and comprehensive training program to equip the best employees with proper training benefiting as a result better supply chain management processes	Strongly Disagree	0	0	3	1.7	1	5.0	4.15
		Disagree	1	5.6	12	7.0	0	0	
		Neutral	0	0	15	8.7	0	0	
		Agree	15	83.3	68	39.5	10	50.0	

No	Choices	Scale	PO		Contractors		Consultants		Mean
			Frequency	Percentile	Frequency	Percentile	Frequency	Percentile	
		Strongly Agree	2	11.1	74	43.0	9	45.0	
8	The application of IT in SCM has significant benefits in SCM process	Strongly Disagree	0	0	1	.6	0	0	4.30
		Disagree	1	5.6	6	3.5	0	0	
		Neutral	2	11.1	12	7.0	0	0	
		Agree	10	55.6	66	38.4	10	50	
		Strongly Agree	5	27.8	87	50.6	10	50	
9	Smooth working atmosphere must be created between each process, sub process, section benefits in SCM process	Strongly Disagree	0	0	5	2.9	1	5.0	4.39
		Disagree	0	0	4	2.3	0	0	
		Neutral	0	0	23	13.4	1	5.0	
		Agree	5	27.8	67	39.0	6	30.0	
		Strongly Agree	13	72.2	73	42.4	12	60.0	
10	Detail and complete Construction materials requirement Plans must be prepared prior to the starting of the expected construction can reduce the challenges of SCM	Strongly Disagree	0	0	1	.6	0	0	4.54
		Disagree	0	0	2	1.2	0	0	
		Neutral	2	11.1	22	12.8	2	10.0	
		Agree	6	33.3	68	39.5	4	20.0	
		Strongly Agree	10	55.6	79	45.9	14	70.0	
11	Strategic construction materials such as re-bar, cement etc must be supplying conformance with construction schedules is can minimize SCM challenges.	Strongly Disagree	0	0	2	1.2	1	5.0	4.25
		Disagree	0	0	4	2.3	0	0	
		Neutral	0	0	11	6.4	1	5.0	
		Agree	9	50.0	104	60.5	11	55.0	
		Strongly Agree	9	50.0	51	29.7	7	35.0	
12	supplying non-strategic construction materials by contractors and users can minimize SCM challenges	Strongly Disagree	0	0	4	2.3	0	0	4.39
		Disagree	0	0	7	4.1	0	0	
		Neutral	2	11.1	8	4.7	1	5.0	
		Agree	7	38.9	82	47.7	9	45.0	
		Strongly Agree	9	50.0	71	41.3	10	50.0	

No	Choices	Scale	PO		Contractors		Consultants		Mean
			Frequency	Percentile	Frequency	Percentile	Frequency	Percentile	
13	Giving awareness and support to the suppliers based on time schedule can reduce SCM process problem	Strongly Disagree	0	0	3	1.7	0	0	4.34
		Disagree	1	5.6	5	2.9	0	0	
		Neutral			19	11.0	2	10.0	
		Agree	13	72.2	75	43.6	7	35.0	
		Strongly Agree	4	22.2	70	40.7	11	55.0	
14	A separate work process that can enable to direct and administer supply of construction materials, the institution must have a division/ section with all powers to check or control whether the materials fulfils standard quality or not is a way of minimizing SCM challenges	Strongly Disagree	0	0	5	2.9	1	5.0	4.22
		Disagree	0	0	7	4.1	0	0	
		Neutral	3	16.7	16	9.3	0	0	
		Agree	9	50.0	73	42.4	8	40.0	
		Strongly Agree	6	33.3	71	41.3	11	55.0	

Source: (Field survey, 2017)

As summarized on table 4.6, 11.1% of PO, 1.2% of contractors and none of consultant respondents were strongly disagreed as the project office must create external communication systems that can enable to have a high quality outcome. (e.g. with suppliers, contractors and clients), none of PO and consultant and 6.4% of contractor's respondents were disagree, 27.8% of PO, 11.6% of contractors and 15% of consultant respondents were neutral, 61.1% of PO, 35.5% of contractors and 45% of consultant respondents were agreed and the remaining 45.3% of contractors and 40% of consultant respondents were strongly agreed.

As shown in the table 4.6, none of the PO, 2.9% of contractors and 5% of consultant respondents were strongly disagreed as the well internal communication processes between procurement, materials management, contract administration, design department and amongst its staffs, is contributes to better SCM process, , none of PO and consultant and 1.7% of contractors respondents were disagree, 16.7% of PO, 9.9% of contractors and 5% of consultant respondents were neutral, 27.8% of PO, 40.7% of contractors and 40% of consultant respondents were agreed and the remaining 55.6% of PO, 44.8% of contractors and 50% of consultant respondents were strongly agreed.

According to table 4.6, none of PO, 2.9% of contractors and 5% of consultant respondents were strongly disagreed as the establishment of an integrated platform for knowledge sharing can deliver substantial results for supply chain improvement, 27.8% of PO, 3.5% of contractors and none of consultant respondents were disagree, 16.7% of PO, 6.4% of contractors and 5% of consultant respondents were neutral, 50% of PO, 41.9% of contractors and 25% of consultant respondents were agreed and the remaining 5.6% of PO, 45.3% of contractors and 65% of consultant respondents were strongly agreed that the establishment of an integrated platform for knowledge sharing can deliver substantial results for supply chain improvement in PO.

According to table 4.6, 5.6% of PO, 2.9% of contractors and 5% of consultant respondents were strongly disagreed as considering suppliers' and subcontractors' development in SCM is used to obtain better results in terms of cost, quality, dependability, among others, from its suppliers, 11.1% of PO, 3.5% of contractors and none of consultant respondents were disagree, 5.6% of PO, 7.6% of contractors and none of consultant respondents were neutral, 72.2% of PO, 42.4% of contractors and 60% of consultant respondents were agreed and the remaining 5.6% of PO, 43.6% of contractors and 35% of consultant respondents were strongly agreed.

As summarized in the table 4.6, none of PO, 2.9% of contractors and 5% of consultant respondents were strongly disagreed as the use of performance measurement systems proves to be crucial in order to face the current market competition, none of PO, 3.5% of contractors and none of consultant respondents were disagree, 11.1% of PO, 11.6% of contractors and 5% of consultant respondents were neutral, 72.2% of PO, 39.5% of contractors and 50% of consultant respondents were agreed and the remaining 16.7% of PO, 42.4% of contractors and 40% of consultant respondents were strongly agreed.

As indicated in the table 4.6, none of PO and consultant and 6.4% of contractors respondents were strongly disagreed as the use of standardized metrics to assess the performance of suppliers and provide feedback for them is a powerful approach for supply chain management improvement, 11.1% of PO, 8.7% of contractors and 5% of consultant respondents were disagree, 11.1% of PO, 17.4% of contractors and 15% of consultant respondents were neutral, 66.7% of PO, 33.7% of contractors and 45% of consultant respondents were agreed and the remaining 11.1% of PO, 33.7% of contractors and 35% of consultant respondents were strongly agreed as the use of standardized metrics to assess the performance of suppliers and provide feedback for them is a powerful approach for supply chain management improvement.

As indicated in the table 4.6, none of PO, 1.7% of contractors and 5% of consultant respondents were strongly disagreed as prepare an extensive and comprehensive training program to equip the best employees with proper training benefiting as a result better supply chain management processes, 5.6% of PO, 7% of contractors and none of consultant respondents were disagree, none of PO and consultant and 8.7% of contractors respondents were neutral, 83.3% of PO, 39.5% of contractors and 50% of consultant respondents were agreed and the remaining 11.1% of PO, 43.0% of contractors and 45% of consultant respondents were strongly agreed that prepare an extensive and comprehensive training program to equip the best employees with proper training benefiting as a result better supply chain management processes.

As indicated in the table 4.6, none of PO and consultant, 0.6% of contractors respondents were strongly disagreed as the application of IT in SCM has significant benefits in SCM process, 5.6% of PO, 3.5% of contractors and none of consultant respondents were disagree, 11.1% of PO, 7% of contractors and none of consultant respondents were neutral, 55.6% of PO, 38.4% of contractors and 50% of consultant respondents were agreed and the remaining 27.8% of PO, 50.6% of contractors and 50% of consultant respondents were strongly agreed that application of IT in SCM has significant benefits in SCM process.

According to table 4.6, none of PO, 2.9% of contractors and 5% of consultant respondents were strongly disagreed as smooth working atmosphere created between each process, sub process, section benefits in SCM process, none of PO and consultant and 2.3% of contractors respondents were disagree, none of PO, 13.4% of contractors and 5% of consultant respondents were neutral, 27.8% of PO, 39% of contractors and 30% of consultant respondents were agreed and the remaining 72.2% of PO, 42.4% of contractors and 60% of consultant respondents were strongly agreed smooth working atmosphere created between each process, sub process, section benefits in SCM process.

As shown in the table 4.6, none of PO and consultant and 0.6% of contractors respondents were strongly disagreed as detail and complete Construction materials requirement Plans must be prepared prior to the starting of the expected construction can reduce the challenges of SCM, none of PO and consultant and 1.2% of contractors were disagree, 11.1% of PO, 12.8% of contractors and 10% of consultant respondents were neutral, 33.3% of PO, 39.5% of contractors and 20% of consultant respondents were agreed and the remaining 55.6% of PO, 45.9% of contractors and 70% of consultant respondents were strongly agreed that detail and complete Construction materials requirement Plans must be prepared prior to the starting of the expected construction can reduce the challenges of SCM.

According to table 4.6, none of PO, 1.2% of contractors and 5% of consultant respondents were strongly disagreed as strategic construction materials such as re-bar, cement etc must be supplying conformance with construction schedules is can minimize SCM challenges, none of PO and consultant and 2.3% of contractors respondents were disagree, none of PO, 6.4% of contractors and 5% of consultant respondents were neutral, 50% of PO, 60.5% of contractors and 55% of consultant respondents were agreed and the remaining 50% of PO, 29.7% of contractors and 35% of consultant respondents were strongly agreed that strategic construction materials such as re-bar, cement etc must be supplying conformance with construction schedules is can minimize SCM challenges.

As shown in the table 4.6, none of PO and consultant and 2.3% of contractors respondents were strongly disagreed as supplying non-strategic construction materials by contractors and users can minimize SCM challenges, none of PO and consultant and 4.1% of contractors respondents were disagree, 11.1% of PO, 4.7% of contractors and 5% of consultant respondents were neutral, 38.9% of PO, 47.7% of contractors and 45% of consultant respondents were agreed and the remaining 50% of PO, 41.3% of contractors and 50% of consultant respondents were strongly agreed that supplying non-strategic construction materials by contractors and users can minimize SCM challenges.

According to table 4.6, none of PO and consultant and 1.7% of contractors respondents were strongly disagreed as giving awareness and support to the suppliers based on time schedule can reduce SCM process problem, 5.6% of PO, 2.9% of contractors and none of consultant respondents were disagree, none of PO, 11% of contractors and 10% of consultant respondents were neutral, 72.2% of PO, 43.6% of contractors and 35% of consultant respondents were agreed and the remaining 22.2% of PO, 40.7% of contractors and 55% of consultant respondents were strongly agreed giving awareness and support to the suppliers based on time schedule can reduce SCM process problem.

As summarized in the table 4.6, none of PO, 2.9% of contractors and 5% of consultant respondents were strongly disagreed as a separate work process that can enable to direct and administer supply of construction materials, the institution must have a division/ section with all powers to check or control whether the materials fulfils standard quality or not is a way of minimizing SCM challenges, none of PO and consultant, 4.1% of contractors respondents were disagree, 16.7% of PO, 9.3% of contractors and none of consultant respondents were neutral, 50% of PO, 42.4% of contractors and 40% of consultant respondents were agreed and the remaining 33.3% of PO, 41.3% of contractors and 55% of consultant respondents were strongly agreed that a separate work process that can enable to direct and administer supply of construction materials, the institution must have a division/ section with all powers to check or control whether the materials fulfills standard quality or not is a way of minimizing SCM challenges.

The percent and mean of various indicators shown in table 4.6 indicated that the project office must create external communication systems that can enable to have a high quality outcome. (e.g. with suppliers, contractors and clients 61.1% (sum of agree and strongly agree) respondents from PO, 80.8%(sum of agree and strongly agree) from contractors and 95% (sum of agree and strongly agree) respondents from consultant which had a mean of 4.27. 83.4% (sum of agree and strongly agree) respondents from PO, 85.5%(sum of agree and strongly agree) from contractors and 90% (sum of agree and strongly agree) respondents from consultant indicated the well internal communication processes between procurement, materials management, contract administration, design department and amongst its staffs, is contributes to better SCM process as shown by a mean of 4.3. 55.6% (sum of agree and strongly agree) respondents from PO, 87.2 %(sum of agree and strongly agree) from contractors and 90% (sum of agree and strongly agree) respondents from consultant indicated, the establishment of an integrated platform for knowledge sharing can deliver substantial results for supply chain improvement as shown by mean of 4.1. 77.8% (sum of agree and strongly agree) respondents from PO, 86% (sum of agree and strongly agree) from contractors and 95% (sum of agree and strongly agree) respondents from consultant considering suppliers' and subcontractors' development in SCM is used to obtain better results in terms of cost, quality, dependability, among others, from its suppliers as shown by mean of 4. The respondents also agreed that the use of performance measurement systems proves to be crucial in order to face the current market competition, 88.9% (sum of agree and strongly agree) respondents from PO, 81.9% (sum of agree and strongly agree) from contractors and 90% (sum of agree and strongly agree) respondents from consultant, as shown by a mean of 4.14. 77.8% (sum of agree and strongly agree) respondents from PO, 67.4% (sum of agree and strongly agree) from contractors and 80% (sum of agree and strongly agree) the respondents from consultant the use of standardized metrics to assess the performance of suppliers and provide feedback for them is a powerful approach for supply chain management improvement as shown by mean of 3.89. 94.4% (sum of agree and strongly agree) respondents from PO, 82.5% (sum of agree and strongly agree) from contractors and 95% (sum of agree and strongly agree) respondents from consultant prepare an extensive and comprehensive training program to equip the best employees with proper training benefiting as a result better supply chain management processes as shown by mean of 4.15.The respondents also agreed that the application of IT in SCM has significant benefits in SCM process,

83.4% (sum of agree and strongly agree) respondents from PO, 89%(sum of agree and strongly agree) from contractors and 100% (sum of agree and strongly agree) the respondents from consultant, as shown by a mean of 4.3. 100% (sum of agree and strongly agree) respondents from PO, 81.4% (sum of agree and strongly agree) from contractors and 90% (sum of agree and strongly agree) respondents from consultant smooth working atmosphere must be created between each process, sub process, section benefits in SCM as shown by mean of 4.39. 88.9% (sum of agree and strongly agree) respondents from PO, 85.4%(sum of agree and strongly agree) from contractors and 90% (sum of agree and strongly agree) respondents from consultant indicated detail and complete construction materials requirement plans must be prepared prior to the starting of the expected construction can reduce the challenges of SCM as shown by a mean of 4.54. 100% (sum of agree and strongly agree) the respondents from PO, 90.2%(sum of agree and strongly agree) from contractors and 90% (sum of agree and strongly agree) respondents from consultant indicated, strategic construction materials such as re-bar, cement etc must be supplying conformance with construction schedules is can minimize SCM challenges, mean of 4.25. The respondents also agreed that supplying non-strategic construction materials by contractors and users can minimize SCM challenges, 88.9% (sum of agree and strongly agree) respondents from PO, 89% (sum of agree and strongly agree) from contractors and 95% (sum of agree and strongly agree) respondents from consultant, as shown by a mean of 4.39. The respondents also agreed that giving awareness and support to the suppliers based on time schedule can reduce SCM process problem, from 94.4% (sum of agree and strongly agree) respondents from PO, 84.3% (sum of agree and strongly agree) from contractors and 90% (sum of agree and strongly agree) respondents from consultant, as shown by a mean of 4.34. 83.3% (sum of agree and strongly agree) respondents from PO, 83.7%(sum of agree and strongly agree) from contractors and 95% (sum of agree and strongly agree) respondents from consultant a separate work process that can enable to direct and administer supply of construction materials, the institution must have a division/ section with all powers to check or control whether the materials fulfills standard quality or not is a way of minimizing SCM challenges as shown by mean of 4.22.

As indicated in the above table 4.6 the mean value for all variables greater than 4 and the majority of the respondents around 85% agreed that the project office must create external

communication systems that can enable to have a high quality outcome (e.g. with suppliers, contractors and clients), the well internal communication processes between procurement, materials management, contract administration, design department and amongst its staffs, is contributes to better SCM process, the establishment of an integrated platform for knowledge sharing can deliver substantial results for supply chain improvement, considering suppliers' and subcontractors' development in SCM is used to obtain better results in terms of cost, quality, dependability, among others, from its suppliers, the use of performance measurement systems proves to be crucial in order to face the current market competition, the use of standardized metrics to assess the performance of suppliers and provide feedback for them is a powerful approach for supply chain management improvement, prepare an extensive and comprehensive training program to equip the best employees with proper training benefiting as a result better supply chain management processes, application of IT in SCM has significant benefits in SCM process, smooth working atmosphere must be created between each process, sub process, section benefits in SCM, detail and complete construction materials requirement plans must be prepared prior to the starting of the expected construction can reduce the challenges of SCM, Strategic construction materials such as re-bar, cement etc must be supplying conformance with construction schedules is can minimize SCM challenges, supplying non-strategic construction materials by contractors and users can minimize SCM challenges, giving awareness and support to the suppliers based on time schedule can reduce SCM process problem and a separate work process that can enable to direct and administer supply of construction materials, the institution must have a division/ section with all powers to check or control whether the materials fulfils standard quality or not is a way of minimizing SCM challenges.

CHAPTER FIVE
SUMMARY OF FINDINGS, CONCLUSIONS & RECOMMENDATIONS

5.1 Introduction

The study sought to analyze Construction Supply Chain Management Constraints and Mitigation Measures. This chapter deals with the summary of findings, conclusions and recommendations.

5.2 Summary of Findings

Generally, this study has tried to identify the following factors affecting the performance of construction supply chains.

- In PO shaped external communication exists with suppliers, contractors and clients and internal communication processes between departments and amongst its staffs is constraints to SCM.
- There is lack of supply chain technical know-how and coordination mechanism on project activity duration.
- Construction materials requirement plans are not complete and details are missing, procurement of construction materials takes a long time, local suppliers have limited capacity, construction material supply are not managed as a process and has long period for approval of tests and inspections, changed design and material specification is basic factor for material wastage and increment of project costs, difficulties related to the management of stock and have no developed strategy yet on supply-chain-management related wide technology
- Top management support on SCM is low or there are no sufficient supports from top management on SCM (the top management is not establishing unity of purpose and direction of the company to managing the supply chain, the development of human resources, teamwork, and employee commitment are not concerns people and employees are not fully involved and their abilities are not empowered for the company's benefit)
- An organizational structure of PO cannot support the supply chain management system,
- Lack of permanent and sustainable strategic goal in order to improve the project office's programs,

- Lack of a condition where internal and external supply chain members can fully utilize appropriate technology,
- Top management bodies/Authorities/ lack of conceptual knowledge how to deal with the art of supply chain management
- The use of performance measurement systems proves to be crucial in order to face the current market competition.
- Prepare an extensive and comprehensive training program to equip the best employees with proper training benefiting as a result better supply chain management processes.
- Application of IT in SCM has significant benefits in SCM process.
- Smooth working atmosphere must be created between each process, sub process, section benefits in SCM process.
- Detail and complete construction materials requirement plans must be prepared prior to the starting of the expected construction can reduce the challenges of SCM.
- Strategic construction materials such as re-bar, cement etc must be supplying conformance with construction schedules is can minimize SCM challenges.
- Supplying non-strategic construction materials by contractors and users can minimize SCM challenges.
- Giving awareness and support to the suppliers based on time schedule can reduce SCM process problem.

5.3 Conclusions

In this research, the constraints on SCM in the real practice of SCM construction projects were assessed. The researcher has tried to investigate opinions from the experts of the concerned organizations, opinions from consultant and opinions from contractors about the SCM and constraints on SCM was gathered.

The following conclusions are drawn based on the assessment made on the status of SCM information gathered through questionnaires from experts, consultants and contractors.

5.3.1 Conclusions about factors that affecting the SCM process

According to the findings, lack of external communication exists with suppliers, contractors and clients and internal communication processes between procurement, materials management, contract administration, design department and amongst its staffs, lack of supply chain technical know-how and coordination mechanism on project activity

duration, lack complete construction materials requirement plans and details are missing, long time taken on procurement of construction materials, limited capacity of local suppliers, construction material supply are not managed as a process and has long period for approval of tests and inspections, changed design and material specification, difficulties related to the management of stock and have no developed strategy yet on supply-chain-management related wide technology, the project office is not fully used technology appropriately both internally and externally with the members of supply chain, current procedures practiced in the constructions logistics could not protected construction inputs from damage during construction and delivery and lack of automated system in place to manage both cost and time, lack of top management support on SCM and lack of well-defined scope of relationship b/n the parties can influence the SCM. In generally lack of well information sharing on SCM, supply chain technical background, understanding the SCM environment, SCM supporting the objectives of the related operation system and support from top management and the different types of direct and indirect SCM challenges can significantly influence the successful completion of the construction projects.

5.3.2 Conclusions About mitigation strategy

According to the finding the mitigation mechanism of the SCM constraint are the following

- Creating external communication systems and providing well internal communication processes between procurement, materials management, contract administration, design department and amongst its staffs
- The establishment of an integrated platform for knowledge sharing can deliver substantial results for supply chain improvement.
- The use of performance measurement systems
- Prepare an extensive and comprehensive training program to equip the best employees with proper training benefiting.
- Application of IT in SCM.
- Creating smooth working atmosphere between each process, sub process, section.
- Preparing detail and complete construction materials requirement plans.
- Supplying strategic construction materials such as re-bar, cement etc conformance with construction schedules.
- Supplying non-strategic construction materials by contractors and users

5.4 Recommendations

The objective of this research was to generate findings from the problems addressed in the literature review through questionnaire. In addition, the ultimate objective of this thesis was to forward recommendations based on the findings of the study. Therefore, the recommendations are focused on addressing the major problems identified through the research process.

- The PO and other concern bodies should have maintained well information sharing system on SCM in order to reduce delay on SC and to reduce the dispute between the parties.
- The PO should have established an integrated platform for knowledge sharing to deliver substantial results for supply chain improvement.
- The current organizational structure could not accommodate and support the existing execution of the PO supply chain management system. So there have to be dynamic organizational structural arrangement.
- The PO should have used standardized metrics to assess the performance of suppliers and provide feedback for them in order to approach for supply chain management improvement.
- The PO and other concern bodies should have prepared an extensive and comprehensive training program as a result equip the best employees and better supply chain management processes.
- The PO and other concern bodies should have applied IT in SCM to reduce paper work and to perform efficient SCM process.
- The PO should have created smooth working atmosphere between each process, sub process, section in order to minimize dispute between parties.
- The project office should have maintained a system in place to manage both cost ad time
- The PO should have prepared detail and complete construction materials requirement plans in order to reduce the challenges of SCM.
- The project office should maintain separate work process on SCM.
- The project office should Supply strategic construction materials such as re-bar, cement etc conformance with construction schedules and established a system for Supplying non-strategic construction materials by contractors and users.

5.5 Further Study

This study is limited to investigating stakeholders' perspective which might be alter through time and need to elaborate and filled the drawbacks with optimization and or simulation model analysis researches.

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APPENDIX-Questionnaire

Addis Ababa University
School of Commerce
Masters of Art in Logistics and Supply Chain Management

Questionnaire on "Analyzing Supply Chain Management Constraint and Mitigation Measure: The Case of Addis Ababa Housing Construction Project Office"

Dear Respondents,

This questionnaire is designed to analyzing supply chain management constraint and mitigation measure: the case of Addis Ababa housing and construction project office. This study is conducted in partial fulfillment of the requirements for the Master's degree in Logistics and Supply Chain Management at Addis Ababa University. Its main objective is to analyzing supply chain management constraint and mitigation measure: the case of Addis Ababa housing and construction project office.

Your response is vital to the outcome of the study and you are requested to completely and objectively answer all questions. The research is going to be carried out based on your responses and other relevant data that could support it. It forms a major part of the research and the information you will enable the researcher to critically analyze supply chain management constraint and mitigation measures of Addis Ababa housing construction project office.

Your cooperation to respond genuinely is very important to this study. Please answer all questions. Space is provided at the end of the questionnaire for you to add further explanations or comments. I would promise that all information you provide would be strictly confidential.

Please tick **(✓)** or provide your own answers where applicable.

Thank you in advance for your indispensable cooperation to spare invaluable time and energy to complete these questionnaires Name: Teshome Metaferia MA student at AAU School of Commerce Telephone: +251911463126

Questionnaire No: _____

Enumerator Code: _____

Date: _____

PART1. General information and demographic background of respondents in the selected samples of Addis Ababa housing construction project office crew.

1.1 Age Bracket

- ○ Less than 25 Years
- ○ 26-34 Years
- ○ 35-44 Year
- ○ 45-54 Years
- ○ Over 54Years

1.2 Educational Background

- ○ Certificate
- ○ Diploma
- ○ BA/BSC Degree
- ○ MSc/ MA
- ○ Other Specify _____

1.3 Your Position

- ○ Specify _____

1.4 1.5. How many years have you been employed in this Company?

- ○ 1-5 Years
- ○ 6-10 Years
- ○ 11-15 Years
- ○ Over 15 Years

PART2: The following statements concerned about the constraint/bottlenecks of supply chain management practices in Addis Ababa Housing Construction Project Office. Please rate to what extent you agree on the following. Please indicate the extent of your agreement with each statement by ticking (✓) a number from 1 to 5. The scale below will be applicable:

1 = **Strongly Disagree**, 2 = **Disagree,** 3 = **Neutral**, 4 = **Agree,** 5 = **Strongly Agree**.

Note: - Select only one among the options given below

1	**Information sharing**	**1**	**2**	**3**	**4**	**5**
1.1	The project office has no awareness about malicious logic on hardware or software to our supplier communications.					
1.2	The project office have no shaped external communication exists (e.g. with suppliers, contractors and clients) and contributes to high quality outcomes.					
1.3	Internal communication processes between procurement, materials management, contract administration, design department and amongst its staffs, have not well defined communication as it is.					
2	**Supply chain technical background**	**1**	**2**	**3**	**4**	**5**
2.1	Lack of supply chain technical know-how					
2.2	There is still have lack of coordination mechanism on project Activity duration					
3	**Understanding the SCM environment**	**1**	**2**	**3**	**4**	**5**
3.1	Construction materials requirement Plans are not complete and details are missing					
3.2	Procurement of construction materials takes a long time					
3.3	Local suppliers have limited capacity					
3.4	Construction material supply are not managed as a process and has Long period for approval of tests and inspections					
3.5	Changed design and material specification is basic factor for material wastage and increment of project costs					
3.6	Difficulties related to the management of stock					

3.7	We have no developed strategy yet on supply-chain-management related wide technology.					
4	**Supporting the objectives of the related SCM system**	**1**	**2**	**3**	**4**	**5**
4.1	The office is not fully used technology appropriately both internally and externally with the members of supply chain.					
4.2	Current procedures practiced in the constructions logistics could not protected construction inputs from damage during construction and delivery.					
4.3	The organization has no a system in place to manage both cost and time.					
5	**Support from top management**	**1**	**2**	**3**	**4**	**5**
5.1	The top management is not establishing unity of purpose and direction of the company to managing the supply chain.					
5.2	Employees are not fully involved and their abilities are not empowered for the company's benefit.					
5.3	The development of human resources, teamwork, and employee commitment are not concerns people.					
6	**SCM environment with regard to its establishment**	**1**	**2**	**3**	**4**	**5**
1	An organizational structure of PO supports the supply chain management system					
2	In order to improve programs the project office's establish a permanent and sustainable strategic goal					
3	Internal and external supply chain members fully utilize appropriate technology					
4	In the area where construction of logistics is currently undergoing a system of handover properties regarding warehouses the storage of construction inputs protected from damage or stolen.					
5	The project office has a system in place to manage both cost and time.					
6	Top management bodies /Authorities/ has a conceptual knowledge about how to deal with the art of supply chain management.					

7	In order to have an effective and efficient supply chain a practical and unified direction created by the top management.					
8	A favorable conditions created for the employees to enable them maximize their capacity and knowledge.					
9	The project office implements a strategic objective for permanent and continuous improvement of overall SC performance					

Any other; please State:

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PART3: The questionnaires here in under mentions are considered to give mitigation measures /recommendation /Solution/ regarding to the supply chain management constraints of Addis Ababa Housing Construction Project Office. Please rate to what extent you agree on the following. Please indicate the extent of your agreement with each statement by ticking (✓) a number from 1 to 5. The scale below will be applicable:

1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree 5 = Strongly Agree.
Note: - Select only one among the options given below

	Mitigation measures /recommendation /Solution/	**1**	**2**	**3**	**4**	**5**
1	The project office must create external communication systems that can enable to have a high quality outcome. (e.g. with suppliers, contractors and clients					
2	The well internal communication processes between procurement, materials management, contract administration, design department and amongst its staffs, is contributes to better SCM process					
3	The establishment of an integrated platform for knowledge sharing can deliver substantial results for supply chain improvement					
4	Considering Suppliers' and Subcontractors' Development in SCM is used to obtain better results in terms of cost, quality, dependability, among others, from its suppliers					
5	The use of performance measurement systems proves to be crucial in order to face the current market competition					
6	The use of standardized metrics to assess the performance of suppliers and provide feedback for them is a powerful approach for supply chain management improvement					
7	Prepare an extensive and comprehensive training program to equip the best employees with proper training benefiting as a result better supply chain management processes					
8	The application of IT in SCM has significant benefits in SCM process					
9	Smooth working atmosphere must be created between each process, sub process, section benefits in SCM process					

10	Detail and complete Construction materials requirement Plans must be prepared prior to the starting of the expected construction can reduce the challenges of SCM process					
11	Strategic construction materials such as re-bar, cement etc. must be supplying conformance with construction schedules is can minimize SCM challenges.					
12	supplying non-strategic construction materials by contractors and users can minimize SCM challenges					
13	Giving awareness and support to the suppliers based on time schedule can reduce SCM process problem.					
14	A separate work process that can enable to direct and administer supply of construction materials, the institution must have a division/ section with all powers to check or control					

Any other; please State:

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