Examining the effects of the Contract Based Supply Chain Management in Cyprus Turkish Construction Industry

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ABSTRACT

Over the last few decades, development part of Turkey has been growing rapidly, Economically Turkish government has assigned a noteworthy accentuation over the industry as a subsequent of the heightening public request of business, mechanical and private developments including low-cost residential construction.

For that reason, a well-disciplined remedy intending to minimize waste, time and cost in construction industry to confront the situation looks to be vital. It is controverted that one of the dependable practices that predominantly might be the remedy to construction industry's dispute, time and cost excess is the Supply Chain Management (SCM), the concept that has firstly appeared and progressed in car manufacturing industry where has attained success to manufacturing business. Construction industry has the faith that Supply Chain Management has high possibility in enhancing the productivity of implementing the activities of construction process. However, this practice has not been adequately applied in many countries especially in Northern Cyprus and Turkey.

The main aim of this study is asses and examine the SCM implementation process in Cyprus Turkish construction industry with focus on the effective procurement and supply of building materials with the implementation of a valid written contract. This, it is planned to achieve by differentiating the weaknesses and strengths of this industry by a detailed literature review, then checking up the existing act of the industry all the way through a questionnaire survey gathered from construction industries' stakeholders and experts. The model framework of our study will include the benefits

of contracts in the application of SCM in the construction industry; barriers (lack of a well written contract) of the effective implementation SCM in the procurement and delivery of building materials, and factors that strengthen the implementation.

Keywords: Contract, Cyprus Turkish Construction Industry, Framework Model, Procurement, Supply Chain Management.

ÖZ

Son birkaç yıl içinde, Türkiye 'nin Kalkınma Bölümü hızla büyüyor, ekonomik Türk hükümeti, iş, mekanik ve özel en yüksek sosyal istek bir sonraki olarak bu sektörde önemli bir vurgulu atandı gelişmeler özellikle düşük maliyetli konut ve uygun fiyatlı konaklama.

Bu nedenle, inşaat sektöründeki maliyet, zaman ve atıkların azaltılması amacıyla iyi organize edilen bir dönüşüm bu durumla başa çıkmak için gerekli görünüyor. Bu muhtemelen inşaat endüstrisinin çatışmalar ve zaman ve maliyet taşmaları için çözüm olabilir iyi düşünce teknikleri biri tedarik zinciri yönetimi (SCM), ortaya çıktı ve araba imalat sektöründe geliştirilen kavramı olduğunu savunuyor ve bu sektöre de başarı getirdi. Bu tedarik zinciri yönetimi birçok yönden inşaat endüstrisinin genel verimliliğini artırmak için potansiyele sahip olduğuna inanılmaktadır. Ancak bu teknik özellikle Türkiye 'de pek çok ülkede verimli bir şekilde uygulanmamıştır.

Bu çalışmanın ana amacı, Türk inşaat sektöründe SCM uygulama amacı ile geçerli bir yazılı bir uygulama ile yapı malzemelerinin etkili alımı ve temini üzerine odaklanarak yeterli bir kavramsal çerçeve geliştirmektir Sözleşme. Bu, ayrıntılı bir literatür incelemesi yoluyla bu sektörün güçlü ve zayıf noktalarını ayırt ederek, endüstrinin uzmanlarından toplanan bir anket anketi boyunca sektörün mevcut performansını analiz ederek elde etmek planlanmaktadır. Paydaş -ların. Çalışmamızda model çerçevesi, SCM 'nin inşaat sektöründe uygulanmasında sözleşmelerin avantajlarını içerecek; engelleri (iyi yazılı bir sözleşme eksikliği) etkili uygulama SCM tedarik ve yapı malzemelerinin teslim ve uygulama güçlendirmek faktörler.

Anahtar kelimeler: Türk inşaat endüstrisi, Tedarik Zinciri Yönetimi, Tedarik, Sözleşme.

DEDICATION

I dedicate this thesis to the Almighty Allah.

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LIST OF ABBREVIATIONS

ANP	Analytical Network Process
BIM	Building Information Modelling
CLM	Council of Logistics Management
CSC	Construction Supply Chain
CSCM	Construction Supply Chain Management
GDP	Gross Domestic Product
GNP	Gross National Product
JIT	Just-In-Time
MSCM	Manufacturing Supply Chain Management
PDP	Production-Distribution Problem
SC	Supply Chain
SCM	Supply Chain Management
SD	Standard Deviation
SMEs	Small and Medium-Sized Enterprises
SPSS	Statistical Package for Social Science
TQM	Total Quality Management

Chapter 1

INTRODUCTION

1.1 Background

Construction industries are designed to meet the demand of buildings, infrastructures and industrial amenities for the use of the people. The construction industry is unique due to its complex nature and immense magnitude. Most countries' development, sovereign wealth and economy are linked to construction projects that are built on keen sustainability and adequate maintenance (Pryke, 2009; Myers, 2013).

Construction is a sector that creates employment opportunities, structures and a huge financial investment contribution to the economy (Erol, 2015). The end-products of the construction industry range from simple to huge, immobile and complex structures such as bridges, drainage, factories, irrigation systems, ports, residential buildings, schools, underground facilities, just to mention a few (Yu and Lo, 2005). Additionally, the sector deals with all kinds of maintenance and repair services to sustain the durability and improvements on all the listed structures (OECD, 2010). Construction is a project-oriented industry, which requires systemic, strategic, efficient and effective use of labor, materials, machinery, time, cost, contractors, technology and all other important components (Polat, 2017). Therefore, it implies that construction activities can yield optimum output when all the mentioned elements effectively work together (Koskela 2000).

The single unit of the whole construction network is as important as any other unit and consideration of one is a consideration of all (Cox and Ireland, 2002).

Just as in most sectors of the economy, the demands of the construction industry are increasingly growing; lower costs, more responsive and faster construction process, more reliable work schedules and higher-quality facilities, shorter execution of projects are required and demanded in the construction industry (O'Brien et al., 2002).

Since the success of civil projects is evaluated using the parameters of cost, quality and time of completing a project, the performance of many civil projects has not been up to the required standards (Ali, 2014). It is proven that the construction industry has made great strides technologically and management wise, yet the industry is often and continues to be, sometimes criticized for its low or poor performance at nearly every stage of its operation (Cox and Ireland, 2002). Beliz and Emrah (2015) stated that the sector is one of the industries that is highly inefficient, low-performing, arms-length relationships, lack of coordination and commitment, poor stakeholder communication with fragmented nature that requires relevant strategic and innovative solutions. Also, the industry is marred by poor performance resulting from time and schedule delays or overruns, poor health and safety performance and quality defects (Love et al., 2004).

Parallel to the global growth in the sector, there are lots of challenges hindering all its units to efficiently work together to yield the optimum output (Özlem and Ömer, 2016). Findings emanating from existing studies reveal construction industry has a fragmented nature, lack of communication and coordination

between the participants, of customer-supplier focused, adversarial contractual relationships, price-based selection and ineffective use of technology (Love et al., 2004; Meng, 2010). Such challenges comprise inefficiency of human capital, wastes, time delay, cost mismanagement, contract disagreement, lack of coordination of all the elements, lack of adequate communication and cooperation among the key players, etc. (McKee and Ross, 2012;).

Certainly, the failure of the construction industry to be consistent with system and technological advancements which are utilized by other industries is an area of interest for many researchers, scholars, stakeholders, governments and other key players of the construction industry in the last few decades (Akinloye et al., 2000). The continued negative indication has caused a more focus on systemic change in how the construction industry should function and operate (Egan, 1998; Behera et al., 2015).

Today, the construction industry is tending on an era of modification in how it functions and operates and is providing steady alterations initiated by the demand to comply to new regulations and legislations and the comprehensive use of management and technology concepts (YiIamz and Kanit, 2018). For this reason, there is a need to be conscious of the importance of contract in delivery of materials from suppliers to the contractors with full adherence to the stipulated rules and guidelines. This embedded on oversight on the importance of contract which is needed to be part of the new era in the building industry. The output of such alternations exposed that traditional industry practice and structure are graded on a moving course in an effort to decrease the industry challenges, improve performance, delivery and customer pleasure on civil works (Erol and

Unal, 2015). Certainly, the industry today is defined facing a paradigm shift to increase stakeholder interactions, effective and efficient collaboration, lead times, productivity, quality and sustainability, infrastructure value, reduced construction project costs and life cycle costs (Vrijhoel and Koskela, 2000). To this end, we chose to add to the paradigm shift by researching on the importance of the contract-based SCM in the delivery of building materials from suppliers to the contractors.

In order to tackle the bulk of the challenges faced by the construction industry with focus to the delivery of building materials, it has to begin from the very basic perspective of the sector, such as from the design, planning, scheduling, control, project execution and management **(**Lamming, 1996**)**. Thus, a sustainable, strategic, systemic, deliberate, innovative and efficient-driven interlink should be put in place before, during and after the construction activities. The network bond of the construction elements is termed supply chain flow, in which a continuous flow of activities among the elements prevent, control, manage and sustain any unit from being adversely affected at the expense of the other (Cooper et al., 1997).

The adaptation and integration of the supply chain management (SCM) processes has become a pressing need in today's competitive environment in order to increase efficiencies and effectiveness in all activities and components of the construction industry with regards to building materials: the logistics, procurements, production, collaboration among key players (Edum-Fotwe et al., 2001).

Construction industries are fortifying their activities with modern management and technology for an effective network by adopting the SC strategy (Vrijhoef et al., 1999).

SC entails the network of sectors and activities that involve from the via downstream and upstream interconnections, in different activities and processes that yield value in the services and products in the hands of the valuable client (Christopher, 1992). Meanwhile, the supply chain management (SCM) deals with the entire supply chain, instead of just on one next level, entity or element, and aims to increase alignment, efficiency, effectiveness and transparency of the supply chain's configuration and coordination, in spite of functional boundaries (Cooper and Ellram, 1993).

SCM concept is an idea that originated from the manufacturing industry as a Just-In-Time (JIT) production and logistics (Rben and Lauri, 1999). The first application of SCM was in the JIT delivery system in the Toyota motor factory production system. The first SCM objectives were to regulate supplies, just in the right few–quantity, the right time, to mainly reduce inventory greatly and to control more effectively the interaction of supplies with the production lines (Shingo, 1988).

The supply chain management concept transited from a basic part of industrial lean supply in the production system, total quality management, business process redesign and JIT (Vrijhoef and Koskela, 2000). SCM defined as the management and control of inflow and outflow of goods and services. The traditional concept of SCM in the manufacturing industry was primarily to control logistics. It entails

the storage, movement of raw materials, work-in-progress inventory and products from the place of origin (supply) to the place of consumption (demand) (Butkovic et al., 2016).

SCM aims to attain a good profit for each and every element in the SC by reducing the overall cost, and thus, directly and indirectly, satisfies the supply of producer output and the demands of customer needs (Fei and John, 2013). Empirical studies have proven the SCM concept to be successful in, major industries, thus the concept can be used in the construction industry. The SCM high-level strategic approach can resolve a lot of inherent uncertainties and issues being faced by construction industries with respect to quality, time, cost and labour. (Tek, 2013; Panchanan et al., 2015).

The SCM application has effective and efficient management measures to improve construction performance. In construction, the SCM success is examined using modern tools and technologies through indicators of effective quality, cost and time. In construction, the SCM is considered as a strategic coordination of networking, decision-making on quality, cost, time, materials, machineries, human capital and information flow. The SCM is vital in stages of construction comprises supplying materials and machinery, designing, supervising and executing stages (Ali, 2014).

Many empirical literatures point out that performing supply chain management in the construction industry is beneficial to any type of construction project. Furthermore, the wide-ranging implemented construction works is noticeably affected by the SCM, although it is recent technique on the executive verge (Morledge, et al., 2009). SCM

networking activities have big impact in decreasing the overall cost of the projects (Kim, 2014). In comparison with different industries, in manufacturing cars for instance, in the early levels, significant role was presented by the contractors of the construction industry to verify the SC. A lot of ways and techniques were performed by companies and suppliers of the construction industry in the aim of implementing SCM, where there are still many things behind the SCM concept to be performed.

Also, it is believed that this technique still need to be extremely regarded in the developing countries where the old traditional ways of running and implementing projects in construction industries is still adopted by many companies (Bayraktarn et al., 2009).

SCM deals with the entire SC structure rather than just single or the next entity phase of the construction activities, and aims to increase the alignment and transparency of the supply chain's configuration, coordination, and cohesion, communication, regardless of the corporate or functional boundaries (Aloini et al., 2012). Conventional management is based on transformation view on production, whereas SCM is based on a continuous flow view on production. The transformation vies approach recommends that each stage of the production process is controlled independently, whereas the flow view approach aims on the entire control of the total flow of the production process to achieve a successful civil project (Cooper and Ellram 1993; Vrijhoef and Koskela, 1999).

Within this concept of SCM, Turkey has been selected to be used as a case study, although there is very limited information available concerning the case studies of SCM benefits, barriers to their implementation and challenges in the construction

industries (McCaffer and Root, 2000; Cuttting-Decelle et al., 2007; 2006; 2004; Das et al, 2004; White et al., 2004).

Therefore, this study aims to discuss and evaluate the supply chain management in the Turkish construction industry, which will guide to establish its major benefits, advantages, disadvantages, barriers to implementation, recommendations and solutions in that context.

1.2 Problem Statement

Generally, the construction industry has a negative effect on the environment whenever a poor process and management consumes the activities of the industry in any phase of the construction projects (Kofoworola and Gbewala, 2009; Mahayuddin and Zaharuddin, 2013). Until now, the Cyprus Turkish construction industry is still largely based on traditional methods, having a severe setback from lack of modern management and technology frameworks.

Cyprus Turkish construction industry has some peculiar individualities that may hinder the economic progression significantly, and such include lack of channel leadership, independent inventory management approach, time delay issues, construction cost overruns, lack of information sharing and monitoring, lack construction quality and poor stakeholder attitude, commitment and relations issues etc. (Cooper & Ellram 1999; Polat et al., 2017). Such challenges can result in loss of monetary values, time delay, lack of focus, commitment and coordination among the stakeholders, poor quality operations and products, uncontrolled waste production and other unwanted results.

For instance, Bayraktar et al. (2009) in their studies of the causal analysis of the impact of information systems and SCM practices on operational performance, evaluated the evidence from the manufacturing sector of SMEs in Turkey, and how it influences operational performance, communication and information systems of Turkish firms, and its applicability to other related sectors, out of which constructor sector of Turkey is of paramount interest.

Erol et al. (2010) explores the reverse SCM practices in Turkey to tackle difficulties in construction activities associated with SCM applications in network designs, product designs, production planning, inventory and scheduling managements.

In order to eliminate poor logistic, management, inventory, strategy, design, planning, implementation of projects which can play a crucial role as an obstacle to the construction activities in Turkey and Northern Cyprus, researchers (Sever and Buyukozkan, 2003; Sahin and Baki, 2004) have studied the empirical causes of result of delays in completing projects and monetary loss.

Koctas and Tek (2013) and Ali (2014) in their descriptive, analytical research studies proposed and developed new conceptual, detailed models for the integration of SCM in construction in order to tackle the challenges related to barriers of implementing supply chain management in Cyprus Turkish construction industry. Also, the studies addressed the role of SCM to provide design, supervision and execution roles achieve effective quality, reduce time and expenses.

Vrijhoef and Koskela (2010) still reiterated that even with the adequate implementation of SCM in the construction industry, in their study of the roles of SCM

in construction using an empirical findings and the generic theory of SCM stated that the construction SCM has a large quantity of waste and problems caused by different phases of construction and that the waste and problems are products of obsolete and myopic control of the construction SCM.

Therefore, it is quite clear that as much as the SCM has its applications, benefits and advantages, there still lingers some drawbacks, disadvantages and barriers to its implementation, applications and execution willingly to accomplish its full targets and purposes in the construction industry and its related activities, processes, procedures and products. The booming construction activities in Turkey and Northern Cyprus demand an urgent need to consider the SCM in the construction industry as this will help to synergize the required cohesion, coordination, communication, cooperation between all the elements that function in the sector.

As the construction industry is rapidly growing in Turkey and Northern Cyprus, the proposed supply chain management concept will seek to determine and effect reduction in delay of supply of materials. And, also enhance the delivery procedure of materials from the suppliers to the contractors without being biased in the process.

The Cyprus Turkish construction industry which is still largely based on traditional methods, with proofs of setback from lack of modern management and technology frameworks will take a new dimension with the adoption of a written contract in the scam implementation. Hence, in order to enhance the implementation of SCM in the Cyprus Turkish construction industry with a focus on the supply and timely delivery of construction/building materials, we seek to study the benefits of utilizing a contract-based SCM in the execution of building contracts. To effectively study the benefits of

adopting the contract-based SCM, we also incorporate the review on the barriers of the adopting the contract-based SCM.

1.3 Scope and Objectives

The focal point of this study is to develop the finest approach of applying SCM Contract-Based in Cyprus Turkish construction industry with focus on the effective procurement and supply of building materials with the implementation of a valid written contract. This, it is planned to achieve by differentiating the strengths and fragileness of the construction by a detailed literature review, construct a quantitative examination. The model framework of our study will include the following: The benefits of contracts in the application of SCM in the construction industry; barriers (lack of a well written contract) of the effective implementation SCM in the procurement and delivery of building materials, and factors that strengthen the implementation. To evaluate the model framework, the main process of the research is summarized as:

- To explore the behavior of the construction industry and its current performance, national and international level and then relates it with Cyprus Turkish construction industry with regards to the benefits of SCM.
- To realize the kinds and nature of the complementary elements of the execution of the Supply Chain Management contract-based and their benefits to the industry in Northern Cyprus and Turkey
- To explore the factors that can cause fault in SC and the consequences of those obstacles on construction projects in Northern Cyprus and Turkey
- To elaborate a method of resolving the SCM matters specifically materials delay and deliver probable Suggestions to Cyprus Turkish construction industry
- To design a conceptual yet proper framework for SCM contract-based

implementation in Cyprus Turkish construction industry.

1.4 Structure of the Thesis

In this thesis, there are five chapters, the first one is introduction which gives a general background information about supply chain management then highlighting on contract-based SCM, followed by problem statement and objective of this dissertation.

In chapter two, named as the literature review, presents an academic review of preceding studies and researches on supply chain management, construction supply chain management and finally the contract-based supply chain management.

In the third chapter, it explains the method exercised in the scientific estimation or analyses of the research. It shows in detail how the research is conducted, expresses in details the construction, source of data collection, distribution and retrieving of the data from the techniques and questionnaire format employed in estimating the final data analyses.

In the fourth chapter, data collected from the questioner are analyzed thoughtfully and illustrated in figures and tables, then profound discussions and comments were presented.

Eventually in chapter five, comprehensive conclusion including achievements of the thesis with definitive inference subsequently recommendations and suggestions for future studies.

Chapter 2

THEORETICAL BACKGROUND

In this chapter, a comprehensive but concise a literature review interlocked with construction supply chain management (CSCM) and application of this concept in Turkish construction industry has been carefully presented. The overview of the existing researches begins with definitions of terms such as the construction and some of its characteristics and followed by the general meaning of supply chain management (SCM). A brief SCM review in construction industries has been comprehensively revised and then narrowed to the CSCM in Turkey. Finally, the SCM in the construction industry, its current situation, potential applications, barrier or challenges, advantages and disadvantages in the Turkey construction are considered in details.

2.1 Construction Industry

Construction is the process of constructing buildings, infrastructure and industrial projects for the use and benefit of the people. Construction is simply defined defines as a systemic production, erection, building maintenance, renovation and repair of static structures with a certain kind of use, the demolition of existing facilities and land development. All construction projects as products possess a common feature, which is, they are fixed in a selected place (Eccles, 1981). Construction entails all-inclusive projects to fabricate any kind of building and other immobile infrastructures in a bounded space. The bulk of construction undertakings is executed before the materials and components before arriving at the construction site. The last stage of the production process is actually to work

on the construction site. The building construction is divided into residential building projects and non-residential (commercial/institutional) (Chitkara, 1998). Infrastructure is termed heavy engineering structure that includes large public projects, bridges, dams, highway roads, railways, utility and water or wastewater distributions. Industrial construction consists of mills and manufacturing plants, process chemical plants, power generation and refineries (Ive, 2000).

Construction produces the structures that provide shelter to a wide variety of human activities, in addition to the infrastructure that connects these facilities into a sophisticated complex network (Picchi, 2002). Also, there are other attributes to divide the construction industry into markets or sectors. The construction industry is a sector in a national economy and commercial enterprise concerned with land preparation, construction, renovation, and repair of the structure, real properties and facilities (Halpin et al., 2010).

The construction activities range from the small-scale projects to megaprojects. Construction begins with the project planning, design and financing until the project involve is built and ready for use. Also, it entails the design, scheduling, budgeting, availability and transportation of building materials, construction site-safety, logistics, execution and maintenance of the infrastructure (Özçelebi, 2011).

Construction can be grouped into three phases: (i) design phase, (ii) site production phase and (iii) component manufacturing phase (Pryke, 2009). Architectures and engineers made up the design phase, contractors made up the site production phase and suppliers made up the component manufacturing phase.

Koskela (1992) defines an industrialized construction as an act of simplifying the modularization and prefabrication of construction site activities and provides help of effective and efficient replication of construction projects with ease. The selection of consultants by a client who needs a building or infrastructure is the first step of action in construction. The consultants prepare the overall construction designs and specifications. Thus, timely, quality and cost-effective off-site activities or operations are vital for the success of construction projects (Koskela, 1992).

Interestingly, construction is the sole task of a general contractor under a contract agreement with the client. Koskela, (1992) stated that the construction has significant unique features from other industries, such as projects, production site, temporary regulatory and multi-organization intervention. Each client has specific needs or priorities. Each construction site has specific climatic, ground and environmental conditions. The specific features or uniqueness of each building or structure are made from designs and solutions offered by the architectures. The production site is locally bound, depends on physical factors such as weather and land conditions (Vrijhoef and Koskela, 2005).

Construction as a project-based entity with a specific assigned group of ad hoc teams. The erratic and complex nature of the construction teams often leads to bottlenecks, but construction SC management can eliminate such issues in the construction industry.

Also, government regulations, laws and policies guiding the construction or building unique designs for a specific territory, state or country. In the literature,

the construction process is grouped into unique sections: (i) architectural and project design, (ii) planning (labor, resources, and time), (iv) site survey and works, (v) internal and external works or installations. Construction can be nicely harmonized for greater production outputs using CSCM (Cheng et al., 2010).

In the worldwide, the Post-World War II era had a rapid growth in the construction sector all over the world. Many countries devoted huge investments in real estate and capital project since 1950. As a result of the development recorded in the construction industry, the real economic activity has been affected positively. The construction sector has had an impact on the sub-sectors and other sectors of the economies of many countries. The growth in the construction sector has played a major role in the employment factors and is expected to provide additional work opportunities for the people. Therefore, sustaining the development of the construction sector has proved to be an indispensable factor in sustaining economic development (Özçelebi, 2011).

The construction sector is one of the major and fastest growing industries in the world and accounts significantly to the economic development, Gross Domestic Product (GDP) and Gross National Product (GNP). The construction industry accounts for 13.4 % of the world's global revenue of $7.5 trillion. It is estimated to increase by 70 % by 2020 to $12.7 trillion. The construction industry is expected to grow by 7.9 % to 2020 in the Central and Eastern Europe. Russia's input leads with a net worth of $117 billion, Turkey's input as the second is expected to attain $81 billion (Alptekin, 2017). Construction sector comprises about 6-9 % of the GDP of developed and developing countries (Chitkara, 1998).

Although until now, the construction industry has created great landmarks in management and technology wise throughout the world, however, there are some noticeable challenges and drawbacks that have been identified in this industry (Pryke, 2009). Squicciarini and Asikainen (2011) acknowledged that, contrary to its importance to the economies and gross financial contribution to the sovereign wealth, the construction industry is generally regarded as a low-technology, low-productivity, low government friendly policy (causes high barriers to entry). It is also argued that the sector is under-performing as a dynamic industry when compared to other existing production industries: automotive or mobile phone industry (Özlem and Ömer, 2016). According to Meng (2010) and Love et al. (2012), the findings gathered from their studies, some critical aspects of the construction industry such as fragmented nature, inadequate adversarial contractual relationships, lack of communication and coordination between participants, inappropriate price based selection, lack of customer-supplier focus and ineffective use of modern technology has become a great setback in the construction industry. As it is in other sectors, the demands of clients from the construction industry projects are increasingly booming, therefore, lower cost of materials, labour, machinery and other components of construction, shorter execution durations of projects, faster and more responsive construction industry processes and projects, more reliable construction schedules and higher-standard quality facilities and projects are required and demanded in the construction industry (Love et al. 2002). These demands of the construction industry and all its actors generally involve more timely, quality and cost-effective building design, production, execution, closer coordination between the clients, contractors and the constructors, to the completion of the projects for the benefits of the clients (O'Brien et. al., 2009).

The adaptation and integration of SC processes into the construction industry is an essential need to meet up with the demands in today's global competitive environment and to provide numerous potentials to increase the efficiencies and effectiveness in all construction activities such as procurement, contract, production, collaboration, integration and logistics with subcontractors (McKee and Ross, 2012).

Therefore, the construction SCM programs and processes can be a very effective and efficient technological tool to achieve this kind of demands. Thus, the more effective and efficient the CSCM, the more effective and efficient the construction project executions (O'Brien 1999; Picchi 2002; Pryke, 2009; Tek, 2013; Xiao et al., 2013). The CSCM is not long ago becoming a concept of practice inspired by Manufacturing Supply Chain Management (MSCM) but varies significantly in some areas. It is a detailed and intimate interconnected idea that is mostly attributed to the coordination of distinct quantities of thousands of materials delivered to specific construction projects (Young et al., 2011).

The construction industry has a highly disintegrated nature and it comprises a large number of sub-industries. As a result of the plethora nature of the construction industry, the lack of appropriate communication and problems in maintaining relationships among members of the construction industry (contractors, subcontractors, suppliers, clients etc.) along the supply chain (Ahmed et al. 2002; Benton and McHenry, 2010; Aloini et al 2012; Gosling et. al. 2012).

Such fragmentations lead to complexities and delays, thereby create disagreement among supply chain networks, increase cost and result in grave inefficiencies in the construction industry. Hence, it is wise to set up construction SC in order to confront

the serious problems of the construction industry. In actual fact, many authors (Young et al. 2011; Abduh et al. 2012) has suggested creating CSCM as a potential solution to eliminate all kinds of inefficiencies in the construction industry and to reap the fruits of an integrated and efficient SC. In this study, Turkey construction industry and its CSCM applications, barrier, advantages and disadvantages will be taken up with comprehensive information and a proposal will be given for the creation of successful implementation of the future Turkey CSCM model, process and procedure.

2.2 Turkish Construction Industry

The Republic of Turkey is a major force in the global construction market and the industry. The Turkish construction industry began to develop after the post Second World War in 1945. Turkey giant construction firms were founded and developed rapidly between 1950-1970 due to the USA government 'Marshall Aids' funds given to the country. However, Turkey faced serious economic challenges when the United Nations Development funds and the USA government aids were cut down due to the sanction imposed after the 1973 Turkish-Greece Cyprus Peace War and lasted until 1979 (Tavakoli and Tulumen, 1990; Ozcelebi, 2011). The embargo led to serious economic face-offs, which caused decreased natural resources, reduction in exports and imports, increasing the high rate of inflation and huge unpaid debts to other countries (Tavakoli and Tulumen, 1990). Also, there was clear evidence of the increased unemployment rate in the domestic workers, bankruptcies, legal claims, unfinished jobs in the Turkey domestic and international construction market and industry (Erol and Unal, 2015).

However, the military government of 1980 adopted several precautions and significant changes in the economic policy which led to many short and long-term implementations of stability and structural adjustment plan and programs. Within 7 years (1980–1987),

there was tremendous improvements and key successes in Turkey construction industry. Then, Turkey construction sector began to create a considerable amount of employment opportunities for substantial numbers of architects, engineers and workers. The Turkey construction industry consists of several sub-industrial sectors with activity and trade among them. The stakeholders in the Turkey construction sector are as follows: (i) Government ministries and their general directorates, (ii) municipalities, (iii) private owners, (iv) state economic enterprises, (v) other public agencies, (vi) foreign agencies.

The Turkey construction sector is mostly a non-union. The major public works owners are the Ministry Public Works and Resettlement, the Ministry of Communications and Transportation, the Ministry of Energy and Natural Resources, the Ministry of Tourism, the Ministry of National Defense, and other public corporations and municipal owners. Among all, the Ministry of Public Works and Resettlement is the major owner. It has six general directorates of Railroad, Port, Airport, Highways, Construction Works, Catastrophe Precautions, and Technical Research and Applications (Alptekin, 2017). Since 1980, the Turkey economy has experienced a significant turnaround as a result of the overhauling economic structural and recovery adjustment program. Inflation is outstandingly down: from over 100% to below 25% from early 1980 to the end of 1986. The real growth in the Gross National Product (GNP) is in the same manner astonishing: from < - 1 % (1980) to > + 8% (1986). The 1986 GNP exceeded $49 billion (Ozlem, 2013).

Turkey's construction industry provides facilities to meet the infrastructural needs and demands of her populace, creates about 1.3 million jobs, accounts for 6 % and 11.5 % of GDP and GNP, respectively in 2013 and contributes to 31 % of the country's economic gross net worth share (Alptekin, 2017; Yilmaz and Kanit,

2018). The construction sector has been in consistently increasing trend in the last decade, with the annual growth rates between 10%-20% (Gunluk-Senesen et al. 2018). Despite the financial crisis in the year 2001 and temporary contractions during the global financial crisis (2008-2009), the sector was the first to suffer (Erol and Unal 2015; Erol, 2015). Then, there was a quick accelerated growth, and construction output grew rapidly than the economy as a whole in 2002-2007 and 2010-2011 (Alkay et al. 2017). Erol and Unal (2015) stated that the construction sector played a role in GDP growth from the period of 2010-2014.

According to an international construction sector magazine ‘‘Engineering News-Record’s’’ report published in August 2018, approximately 17 Turkish construction companies are among the top 250 international contractors, which placed Turkey in second position only to China in terms of its total number of firms and the United States of America in the third position on the list. Turkish construction projects are increasing on the trend and will continue to be consistent with technological and scientific advancement in spite of the numerous challenges facing it (Bayramoglu, 2000). The number of Turkish companies on the list has been fluctuating, in spite, Turkish construction industry has competed at global markets for over 40 years has a significant potential internationally despite the shrink in the last decade. Most importantly, the ten-year period of 1993-2003 it shrank with the ratio of 22.4%. In 2005 it increased by the ratio of 19.7%. This review among others is just proof that Turkish construction is performing better than all its counterparts in Eastern Europe, the Middle East and Central Asia countries (Sezgin and Aşarkaya, 2015).

Turkish construction industry is tremendously huge and has become a dominant force both at the domestic and international market with great innovation and technology. Currently, the construction industry is the 6th largest Turkey's economic sector in terms of value it is adding to GDP and employs 7.4% of the total workforce population. From 1998 to 2014, the annual Turkey construction investment increased cumulatively by 80.6%. The cumulative construction rises in investments had been 61% from 1998-2007 but then decreased to about 12% for the period 2007-2014. The Turkey construction sector is noticeably on a stable yearly trend since 2014, at the rate of 4.2%, predicted to be over 8% in 2018, and the investment price size of 154$ billion (ifinfo, 2018).

The Turkish construction industry is one of the major leading sectors in Europe known for creativity, innovation and technology where the number of construction industries, projects and stakeholders is growing rapidly. However, the Turkey construction industry has suffered from downtime, low productivity, wastage of raw materials and inefficient logistics in the last few decades. According to the literature review, many struggles to attain success in its construction industry have been projected and implemented. The key challenges between its have made them take all adequate measures to decrease the inappropriate expenditures as much as possible (Funda et al., 2010).

The management of the materials, machinery, labor and information flows are significant strategic priorities for the construction industries. An exceptional performance in the major areas can boost the profit margin of the construction industries and allow additional greater value and benefit for the economy. Supply chain management (SCM) can be a very useful application for construction firms

in this regard. This is especially attractive if we consider that the construction activity is a process characterized by high levels of fragmentation and where the effective integration, coordination and management of the chain, from suppliers to final clients, is a necessary condition to obtain good results (Ozlem and Omer; 2013).

2.3 Cyprus Construction Industry

In the late 1960s huge tourism began in Cyprus which caused booming in the construction industries, the Turkish intervention after 1974 led to conflict and war where economic stagnation occurred and lasted until the early 1980s. In the 1980s, the university sector took a place by its extensions in Northern Cyprus concurrently with higher educational needs in Turkey, therefore, it was observed in 2002 that there were 6 universities in Northern Cyprus which enrolled more than 3000 employees working in those universities. This university sector caused up booming in the construction industry particularly in commercial, residential and institutional buildings. triggering a construction boom consistent with the cumulative impact of the well-known growth pole theory of economic development (Todaro, 1994, p. 434). According to this theory, recently expanded and reformulated by Paul Krugman (1993, pp. 12–14) in terms of localization and trade, geographic characteristics, internalization (Pheng and Hongbin, 2004, pp. 278–9) sometimes spilling over national boundaries (Yuan, 1993), may confer comparative advantages leading to a further and more sustained growth process.

In the beginning of past two decades, the activity of construction industry was centered on public infrastructural projects, many highway construction projects were implemented differently by the financial aid of Turkey. Due to the completions of

these highways, industrial and commercial buildings was generated and expanded which strongly stimulated the development and growth of industrial estates. Industrial growth, in turn, set the stage for a second wave of residential construction starting in the first decade of 2000. Bayramog˘lu (1997) pointed out that 89% of total construction in Nicosia, 84% in Famagusta and 92% in Kyrenia were built for residential purposes, 8% in Nicosia and Famagusta and 7% in Kyrenia were built for commercial use. The rest were built for industrial purposes. The statistics given for Nicosia are very similar for the whole of the TRNC (SPO, 2002b).

2.4 Supply Chain Management (SCM)

Supply chain (SC) comprises a network of major business facilities and processes, consisting of end users and suppliers that develop and provide products, services and information. Conventionally, in order to implement the SCM concepts, all the business inventories such as planning, marketing, distribution, manufacturing, purchasing and organizations along with a supply chain often acted independently. The value of harnessing all elements along SC has been investigated, identified and valued in many industries. SC application helps to minimize cost, improve alertness to changes, improve the customer value and service level, and enhance decision making (Vrijhoef and Koskela 2000; London and Kenley 2001; Cheng et al. 2010). SCM is a basic concept that takes its root from the productive factory to check up and regulate logistics. It defines managing process through which initiative control, runner and regulate the world wide interlink of suppliers, circulation cores, warehouse and traders by which the resources are provided for, processed, transformed and delivered for customer's use. The concept of SCM in manufacturing as applied to construction is provided in Figure 1 below:

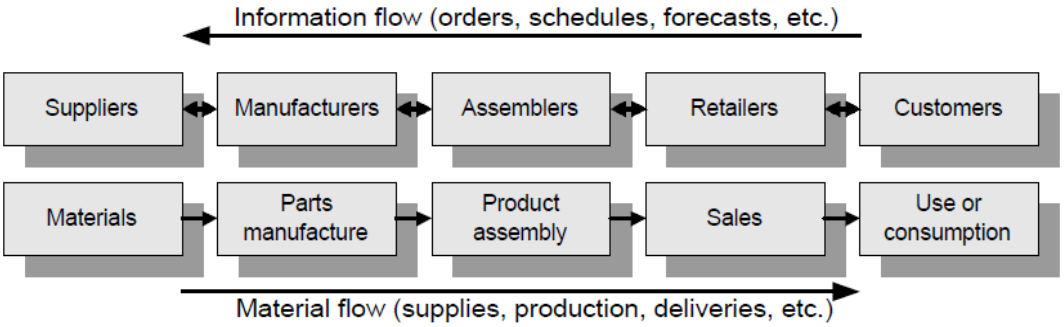

Figure 1: Generic configuration of a supply chain (Vrijhoef and Koskela, 1999).

In the construction industry, the procurement of goods and services; and other procurement connected tasks take place while each stage of a building project (Chirag et al. 2015). As a result of unavoidable challenges and several stages involved in the construction program, provisions of resources like materials, machinery, labor, and other services might not be always delivered punctually, in the right quantity and in the appropriate quality and rate.

Therefore, a strategic management concept such as SCM is vital to fully monitor, control, regulate, sustain and optimize all logistics related activities (Özçelebi, 2001). In the literature, SCM has its applications, benefits, barriers to implementation and challenges, especially those related to construction activities (Ahmed et al 2002; Aloini et al. 2012; Gosling et al. 2013; Ebraim et al. 2015; Koçtaş and Tek, 2013).

Harland (1996) defines the supply chain management (SCM) as an active interlinked flow of network of goods and services, movement and storage of raw materials, via the work-in-progress program to finished products from point of origin to that of consumption. Thus, SCM is designed for consumer or client benefit and satisfaction. The roles of SCM in industries have been well defined in many empirical studies (Panchanan et al., 2015), but limited studies have been conducted in the aspect of SCM in the construction industry (Ulusoy, 2003; Bayraktar et al., 2009), and a very limited

or a few studies have been conducted in about the SCM in Turkey construction industry (Ismail, 2010; Özlem and Ömer, 2013; Isil and Umut, 2015; Ebrahim et al., 2015).

The SCM management finds application in building modelling (BM) integration method for effective virtual design management, site management and virtual construction (Papadonikolaki et al., 2015). Halim (2017) uses the SCM in the classification study on the development stages of construction technologies in Turkey. Umit (2017) applied the SCM to resolve the as Production-Distribution Problem (PDP) using a Stochastic and Fuzzy Uncertainties method. By the consideration of the variables such as the multiple products, multiple suppliers, multiple retailers, multiple warehouses, multiple plants, multiple routes and multiple time in an uncertain environment at the tactical level, the SCM modelling and solution approaches was proposed for PDP to achieve a single-objective function, that is, to maximize the total profit. In their own study, Büyüközkan and Çifçi, (2012) evaluated the green supply chain management practices using a fuzzy analytical network process (ANP) approach to achieve profit and gain market share by lowering the environmental impacts and increasing the efficiency in manufacturing organizations. Gunluk-Senesen et al. (2018) studied about promoting investment in the Turkish construction sector using a structural path analysis. Thus, arrived at a conclusion that the expansion of the construction sector in Turkey in the first decade of the 2000s was as a result of active construction promotion policies by the public sector.

The concept of SCM defines a logical representation of the previous management development, though, with large dominance of logistics, the basic idea of SCM is more than just a logistics (Van der Veen et al., 1997; Cooper et al. 1997). In the real-life scenario, most engineers, contractors and construction managers are either ignorant of or do not directly consider the idea of SCM, nevertheless, they involve in SCM and literally exercise in SCM activities and SCM decisions on a daily basis (London and Kenley 2000; Ive and Gruneberg 2000). SC in construction refers to the complete cycle of stakeholders' participation to achieve a common goal in the interest of construction projects. The stakeholders comprise SC of the owner, designer, planner, engineer, architect, general contractor, construction manager, subcontractors, distributors, suppliers and manufacturers. Other elemental components may include, but not limited to human resources, accounting, equipment fleet operations, warehousing, transportation, production, etc. (Edum-Fotwe et al 2001). In construction projects specifically, the SC may be confined to the owner, designer, planner, contractor, engineers, contractors and suppliers. The demand can be noted in terms of the chain.

Network of information, for example, the project briefs, schedules, drawings, work activities with the smooth flow of materials and goods (McCaffer and Root 2000). Despite the tremendous applications and benefits of SCM in construction and construction activities, the concept is still largely not well practised or understood by many construction stakeholders (Ebraim et al. 2015).

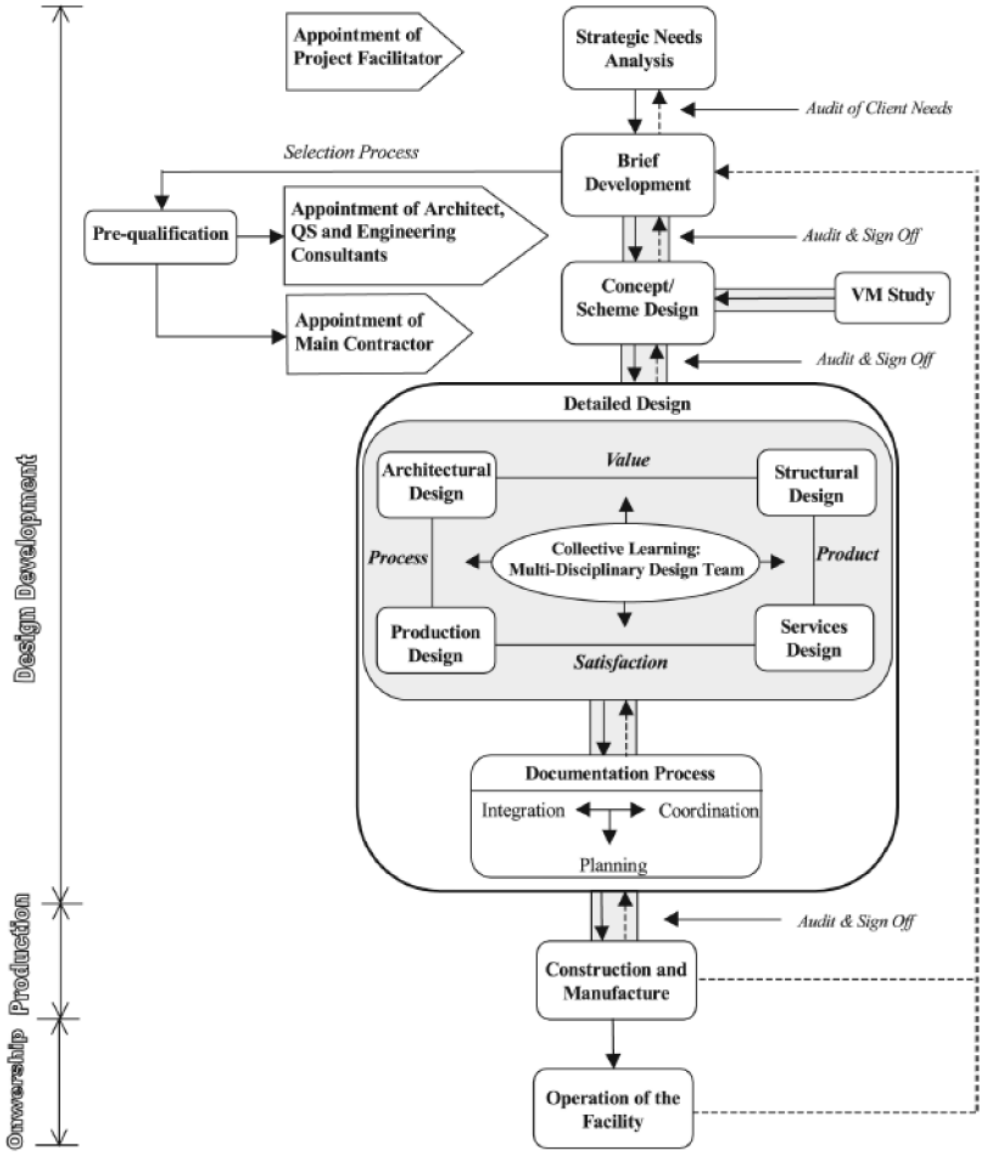

Figure 2: A Simplified Supply Chain Management Model (Love et al., 2004).

In the literature, many models have been suggested to represent the concept of SCM (Koçtaş and Tek, 2013). The models are designed to achieve the demands and necessities of the construction industry and construction projects. The model proposed by Love et al. (2015) is one of the most detailed SCM models ever developed. However, the model proposed by Chirag and Bhavin (2015) indicated the SC activities that are organized through an individual SCM database which must be interlinked with the main project database. Also, this SCM model showed clearly the

information sharing between the construction supply chain stakeholders can effectively plan and control the phases of construction processes and projects.

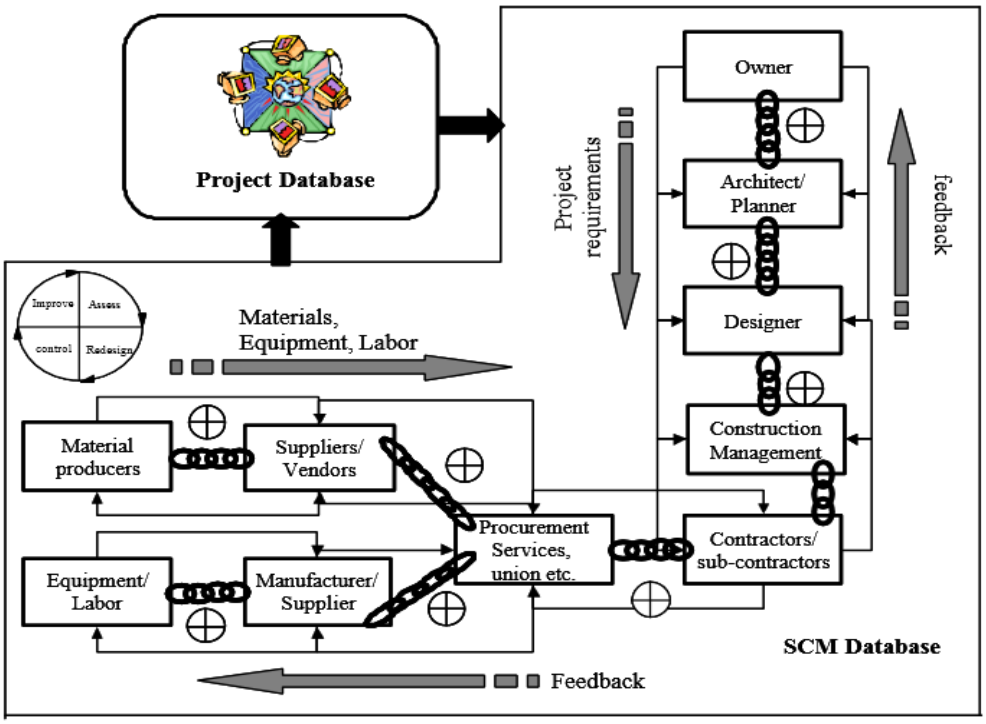

Figure 3: A SCM Model for the Construction Industry (Chirag and Bhavin 2015).

In the literature, the supply chain flow begins and ends with the owner or client. The ultimate goal of the SCM is projected towards the benefit and satisfaction of the client or end user, thus guarantee a win-win SC for all the actors (Monczka et al., 2005; Hatmoko and Scott, 2010; Prajogo and Olhager, 2012). The SCM has its profound applications, uses, benefits, the barrier to implementation, challenges and solutions (Xiaolong et al., 2007; El-Mashaleh, 2009; Akintoye et al. 2000; Dianty et al. 2001; Vrijhoef and others 2001).

SCM views the entire supply chain (Fig. 1), instead of just the next part or level, and its objective is to improve the alignment and transparency of the supply chain's configuration and coordination, in spite of corporate or functional boundaries

(Cooper and Ellram, 1993). The basic concept of SCM is to identify the interrelationship in the SC, and thus increase its control and configuration based on such factors as integration of construction operations. Based on the literature (Cooper and Ellram, 1993), the change from the conventional ways of managing SC towards SCM consists of specific elements as shown in Table 1.

Table 1: Characteristic Differences Between Traditional Ways of Managing the Supply Chain and SCM (Cooper and Ellram, 1993)

Element	Traditional management	Supply chain management
Inventory management approach	Independent efforts	Joint reduction of channel Inventories
Total cost approach Time horizon Amount of information sharing and monitoring	Minimize firm costs Short term Limited to needs of current transaction	Channel-wide cost efficiencies Long term As required for planning and monitoring processes
Amount of co-ordination of multiple Levels in the channel Joint planning Compatibility of corporate philosophies	Single contact for the transaction Between channel pairs Transaction-based Not relevant	Multiple contacts between levels in firms and levels of channel Ongoing Compatibility at least for key relationships
Breadth of supplier base Channel leadership Amount of sharing risks and rewards	Large to increase competition and spread risks Not needed Each treated separately	Small to increase coordination Needed for co-ordination focus Risks and rewards shared over the long term
Speed of operations, information and inventory levels	Warehouse an orientation (storage, safety stock) interrupted by barriers to flows; localized to channel pairs	Distribution centre an orientation (inventory velocity) interconnecting Flows; JIT, quick response across the channel

2.4.1 Advantages of Supply Chain Management (SCM)

Chirag and Bhavin (2015) stated the need for SCM that there is no strong motivation to work in the client's interest when traditional procurement processes are applied by construction companies. The supplier is only asked to deliver the specified goods or services as cheaply as possible. Also, the client's interest is just about the lowest price against fixed prices. The key components of business excellence are SC and innovation both in operations, technology and product development (Ulusoy, 2000). The SCM benefits for individual construction companies in the SC include:

- The incentive to reduce costs and for greater certainty of output cost.
- The incentive process to eliminate waste from the SC process.
- The incentive for better provision of value content to the client.
- The incentive for more repeated businesses with satisfied clients.
- The incentive for greater confidence in budgeting future turnover.
- SCM creates a smooth relationship and builds the enterprise as a whole.
- SCM offers vision and facilitates growth of a consistent supply and demand.

2.4.2 Barrier to Implementation of Supply Chain Management (SCM)

In the practical perspectives, the benefits of SCM provided may not be that easy to achieve, because many barriers to the implementations coexist with the benefits (Akintoye et al. 2000; Vrijhoef et al. 2001; Dianty et al. 2001). The barriers to the implementation of SCM have been categorized into the following:

- Lack of senior management commitment.
- Lack of understanding the concept of SCM.
- Lack of an inadequate organizational structure to support the SCM system.
- The low commitment of partners.
- Uncertain strategic benefits.

- Lack of appropriate information technologies.
- Lack of guidance to create alliances with supply chain partners
- Failure to develop measures for monitoring the alliance
- Lack of appropriate organizational institutionalization
- Lack of integration of the company's internal procedures
- Lack of trust within and outside the company
- Organizational resistance to the concept of supply chain management

2.4.3 Disadvantages of Supply Chain Management (SCM)

Some of the general problems of SCM are as follows (Akintoye et al. 2000; Vrijhoef et al. 2001; Dianty et al. 2001) :

- Discoordination, cohesion and obligation among stakeholders in SC.
- Design errors
- Low materials quality.
- Deficiency in communication and information sharing.
- Inadequate SCM input, mainly poor planning and control.
- Poor work executions by contractors, subcontractors, workers.
- Ineffective ways to measure different parties' performance.
- Lack of understanding the concept of supply chain management
- Having an inadequate organizational structure to support
- Low commitment of partners
- Uncertain strategic benefits and
- Lack of appropriate information technologies.

2.5 Supply Chain Management (SCM) in Construction

The importance of SCM to enhance construction projects began from the early 1990s (O'Brien et al., 2009). Outsourcing is the key strategy in a typical traditional construction industry, where contractors and subcontractors display opportunistic behavior to recover and compensate for insignificant low tendered profit margin. This approach has a lot of challenges and drawbacks, and its remedy is the networking of partnering and reforming the construction industry (Egan 1998; Lathan, 1994; Meng; 2010; McKee and Ross, 2012).

Supply chain management in construction is also referred to as construction supply chain management (CSCM). CSCM is a unique component of SCM which is for specialized characteristics of construction activities. SCM in construction (CSCM) can be termed the network of activities and facilities that provide economic and customer values to the design and functions of contract management, design, development, material and service procurement, materials manufacture and delivery and facilities management (Love et al., 2002). CSCM is basically make-to-order SC, every construction project is unique and with every construction project a new product is provided for (Vrijhoef and Koskela, 2000). CSCM eliminates fragmentation problems in the traditional construction industry and its operations (especially the procurement), by the way of applying a modern, holistic and integrative SCM programs (Pryke, 2009). Also, the CSCM applied information, transactions as a resource tool to assist in eliminating the inefficient division of labour, to reduce cost, increase the speed of facility construction and increase the reliability (Cheng et al,. 2010; O'Brien et al., 2009). CSCM also helps to create an enabling work environment to improve cohesion, coordination, cooperation and

commitment among all the stakeholders in the construction environment (Meng, 2010). CSCM is fully suitable for regulating the lead time, logistics cost and inventory to ensure there is free flow of materials, labor and machineries to the site for the purpose of avoiding disturbances on the workflow. CSCM plays a major role in the global sourcing of assemblies and materials, labor, offsite value-added works (Vrijhoef and Koskela, 2000; O'Brien et al., 2009). CSCM eliminates uncertainty challenges in the construction operations, processes and activities by creating appropriate visibility, awareness, trainings and transparency (Young et al., 2011).

Vrijhoef and Koskela (2000) have provided the basic roles of SCM in construction into four major categories in terms of structure and function of any the construction projects as:

- Focus on the interface between the supply chain and the construction site.
- Focus on the supply chain.
- Focus on transferring activities from the construction site to the supply chain.
- Focus on the integrated management of the supply chain and construction site.

Also, this is illustrated in a Figure 2 showing the characterized elements for each role.

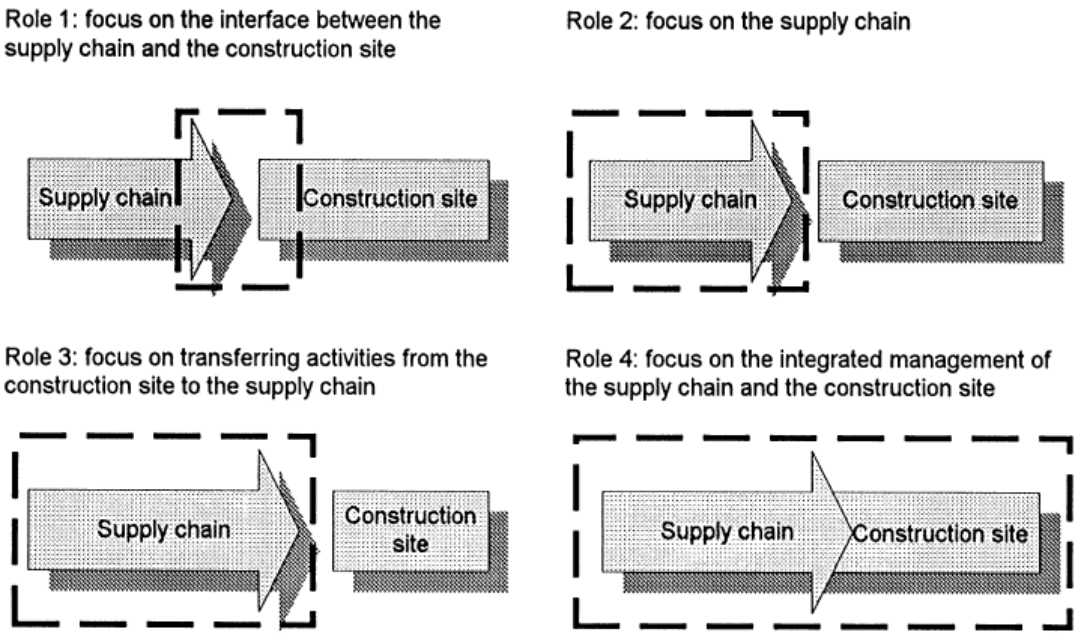

Figure 4: The four roles of SCM in construction (Vrijhoef and Koskela, 1999).

According to Vrijhoes and Koskela (1999), the methodology of SCM can be defined as consisting of four main elements in the Turkey construction industry.

- Supply chain assessment: To assess the current process across the supply chain in order to detect if there are problems and set up mitigation methodology. Once the root causes are detected, then move to the next step.
- Supply chain redesign: To redesign the supply chain in order to provide structural determination of the errors. This contains a new division of responsibilities and tasks of the parties in the SC, and a review of actions.
- Supply chain control: To control the supply chain, according to its new distribution. An essential element of the controlling process is defining the mechanism of controlling to continually measure how the supply chain works.
- Continuous supply chain improvement: To improve, implies that the ongoing evaluation of the supply chain process, and the recurring deployment of the previous three steps: assessment, redesign and control.

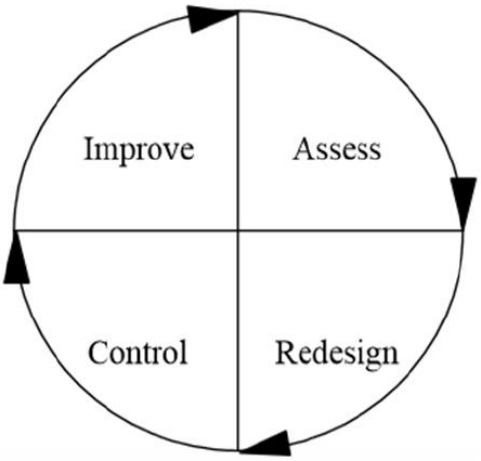

Figure 5: Generic SCM Methodology (Vrijhoes and Koskela, 1999).

A contract-based Supply chain management in construction industry. As proposed by Ring and Van de Ven (1994), a cooperative inter-organizational process framework that involves a line of negotiation, commitment and implementation stages. Each of these ranks involves a number of repeated interactions where the outcome is assessed by organizational management in terms of efficiency and equity. Ouchi, (1980) is of the view that efficiency and equity are needed conditions for all organizational arrangements. Efficiency is the key to most standard models of economic exchange and is used by transaction cost researchers to define the most, and least, costly governance structure for undertaking a transaction. Equity on the other hand is defined as “fair dealing” and is considered to be an equally important criterion for assessing initial conditions in organizational structures (Arino and de la Torre 1998; Ouchi, 1980).

During the implementation of a contractual arrangement the parties engage in a dynamic learning process. This level offers the opportunity for firms in a relationship (suppliers and contractors) to learn from each other as well as influence each other’s thought or perception about their expectation as a partner.

The research is hypothesized in an attempt to streamline the focus on what we are interested in researching. The hypothesis are as follows;

Contract based SCM in Cyprus Turkish Construction Industries

The Contract-based SCM revolves around a line of negotiation, commitment and implementation stage in a cooperative inter-organizational setting (Van, 1994). We adopt this as the dependent variable to test the progress of the contract-based SCM in construction industry, With the view that equity and efficient are needed conditions for all organizational arrangements. In trying to establish the fact-findings whether Contract-based SCM is applicable in the Cyprus Turkish construction industries we hypothesized Contract-based SCM in Northern Cyprus and Turkey as:

H1. *Valid written contracts are not used between contractors and material suppliers in Cyprus Turkish construction industry;*

Benefits of Contract-based SCM in Cyprus Turkish Construction industries

It is common to assume that there are benefits attached to the adopting of contract in construction business and benefits have been chosen as among the independent variables to measure SCM contract. This is more motivation on adopting of contract. Without strong motivation to work in the interest of clients, there will no need to adopt the contract-based SCM (Chirag and Bhavin, 2015). On line with this belief we hypothesized benefits attached to Contract-based SCM in Northern Cyprus and Turkey as:

H2. *The contract based SCM in Cyprus Turkish construction industry has a significant Benefits;*

Barriers of Contract-based SCM in Cyprus Turkish Construction industry

In the practical perspectives, the benefits of SCM provided may not be that easy to achieve, because many barriers to the implementations coexist with the benefits

(Akintoye et al. ,2000; Vrijhoef et al. ,2001; Dianty et al. ,2001). This is why it is considered among the vital independents to measure SCM contract. Also, on line with this belief we hypothesized barriers to Contract-based SCM in Cypriot Turkey as:

H3. *There are barriers in adopting contract based SCM in Cyprus Turkish construction industry;*

Consequences of failure to adopt Contract based SCM in Cyprus Turkish Construction industries

The failure to adopt contract based SCM may lead to negative effects which could be tagged consequences. The failure to adopt the contract based gives rise to moral hazard or hidden action problems (Arrow, 1968). This is why it is considered among the vital independents to measure SCM Contract. We also, hypothesized consequences of failure to adopt Contract-based SCM in Northern Cyprus and Turkey as:

H4. *There are Consequences of not adopting contract based SCM in Cyprus Turkish construction industry.*

Chapter 3

RESEARCH METHODOLOGY

This chapter is the expression of the method applied in the scientific estimation or analyses of the research. It shows in detail how the research is conducted. The chapter accounts for the following subsections: research design; research sample size; population of the geographical location of the study and sample technics or approaches adopted in the study. More so, the chapter explain in details data outsourcing collection, construction, distribution and retrieving of the data from questionnaire format, and the techniques employed in estimating the final data analyses.

3.1 Research Design

The research Design is employed to pattern the entire framework of the study. It equally explains how the combination of the main parts of the study will simultaneously set up and discourse the main objective and central questions of the research. The research design or pattern of this present study is descriptive and quantitative (scientific) estimations that involves using of SPSS to turn our data from figure mode into descriptive manner which will aid in interpreting and making suggestions in regards to policy implications. This descriptive research is purely quantitative study which centers on carrying this research whereby the author gathers primary data with the aid of questionnaire. This is built on insightful data which is used to interpret the current conditions of actions, circumstances, observations, practices, behavior and attitudes of respondents. Descriptive research will assist a

researcher to identify immediate relationship between two or more conditions or issues being investigated (Osula, 2005).

This research design is targeted at examining the importance of contract-based supply chain management (SCM) in Turkish construction industry as it relates to building materials. This will be aimed at enhancement of the Turkish construction sector with the help of SCM based on contract guideline. The effect here is assessed using the attitudinal measurement scale applying the five (5) point Likert scales. The scope and coverage of this study is assumed to be sufficient enough to assist the author to investigate the work. The frame work is constructed in such a way that it shows the effective procurement and supply of building materials with a valid written contract. It equally portrays the consequences of neglecting contract in the implementation of the SCM, the benefits and barriers of efficient implementation of SMC in Turkish construction industry.

This study is centered on descriptive/subjective, and quantitative methodology was undertaken as part of request to pick up a higher comprehension and equally empower a higher and more clear understanding of the outcome from the subjective estimate. The research is directed through a contextual investigation explanation plan. Survey of the respondents was drawn from the different construction companies within Turkey and Northern Cyprus. These construction companies represent the suppliers and staff from the companies. Selected but even survey method was applied in our population of interest in the pilot study. This involves selecting a specific number of respondents from the general or total number of the targeted population. From the population of our interest, we were able to harness a specimen of 65 respondents from

the surveyed construction companies. This sample gave the author the equivalent likelihood possibility of population size being chosen.

3.2 Questionnaire Design

As stated earlier that our work involved the use of questionnaire for data gathering purpose, the questionnaire utilized in our study are divided into three segments. The first segment incorporated the demographic and operational qualities with the intention of deciding the basic issues. The demographic qualities of the respondents were among them. The second segment was used to separate proof of the essentials of contract-based SCM and the four (4) variables of the study were put into core interest. These variables are grouped into dependent and independent variables, dependent variable is the centre piece of the study which is called SCM_Contrat while the independent variables (Consequences, Benefits and Barriers) are the factors or the variables that measure the dependent variables and they are presented in linear relationship with the help of regression. For apt understanding of the variables and why they are considered vital for this work, we brief on them one after the other as follow;

SCM_Contract: This framed around the contract-based supply chain. It revolves around a line of negotiation, commitment and implementation stage in a cooperative inter-organizational setting (Van, 1994). We adopt this as the dependent variable to test the progress of the contract-based SCM in construction industry. With the view that equity and efficient are needed conditions for all organizational arrangements.

Consequences: Because the work focuses in examining the impact of contract-based SCM in construction, we include consequences as among the independent variables to measure the dependent variable (SCM_Contract). The failure to adopt contract-based SCM may lead to negative effects which could be tagged consequences. The failure to

adopt the contract-based gives rise to moral hazard or hidden action problems (Arrow, 1968).

Benefits: Among the hypothesis of this work is that there are benefits attached to the adopting of contract in construction business and benefits have been chosen as among the independent variables to measure SCM_Contract. This is more motivation on adopting of contract. Without strong motivation to work in the interest of clients, there will no need to adopt the contract-based SCM (Chirag and Bhavin, 2015).

Barriers: In as much as the contract-based SCM seems not so beneficial, it is totally free from some obstacles that can hinder the full implementation. In the practical perspectives, the benefits of SCM provided may not be that easy to achieve, because many barriers to the implementations coexist with the benefits (Akintoye et al. 2000; Vrijhoef et al. 2001; Dianty et al. 2001). This is why it is considered among the vital independents to measure SCM_Contract. The research gathered quantitative data from the month of March 2019 to the month of May 2019 with the help of research assistant who assisted on the areas of language interpretation and in explaining to the non-English speaking personnel about the reason for the survey. We encountered some challenges but where it demonstrates challenge for the respondents to answer and finished the questions in the survey materials, the researcher left it with the respondents and returned later to collect it back. All the questionnaire was coded (from agree, disagree etc.) as the researcher is aware of the varying character or perceived feelings of the respondents towards the survey materials. The data was coded for easy gathering of the questions into different classifications after which the data was grouped for easy analyses of the results.

3.3 Sample Size

This study employed roughly 290 managers and senior engineers of the covered Cyprus Turkish construction companies to be the sample of this study. By checking the contractors list of Northern Cyprus from the contractor's association, it was found that 290 contractors and companies are paying their fees annually to the contractor's association. Furthermore, companies who have at least one construction project in progress within the past 5 years which are 107 company, were selected to adopt their opinion into the analysis and fortunately 65 responses were received. Careful measures and consultations were put into considerations before considering any of the chosen factors to ascertain the sustenance of the flow of construction business with the assistant of SCM.

3.4 Population of the Study

The study has a reasonable population including engineers, managers and owner to cover the Cyprus Turkish construction companies. The specific features of the population are those that appeared on the demographic section of the survey instrument. They are gender which includes both male and female but mostly male; Age rang which fall within 32 and above; positions occupied and years of experience. Therefore, the owners and the managers of the different Cyprus Turkish construction companies are included in the population of this research.

3.5 Instruments: Sources of Data and Data Collection Method

Data collection is performed with the instrument of questionnaire and the source of the data is primary data only. By this primary source of data, opened up new raw-fact or data to the author ad allows to give credence to the study questions and ascertain the importance of this work.

Questionnaire is among the tools employed in collecting the primary data. It was prepared the researcher using a 5-point Likert rate scaling questions. The questions were divided into sections 1 and 5 and these comprise two dissipations of strongly disagree and strongly agree. It was administered by the researcher with the assistance of the research assistant to confirm the accuracy of the information provided by the respondents. Letter of introduction was prepared alongside of the questionnaire and oral/verbal introduction was also applied to solicit assistance with open heart and void of bias from the respondents that will join to the questions on the survey materials. The researcher equally employed research assistants and indigenous friends with the intention of using an insider to curtail the fear of facing unfriendly respondents who might not be free or have open mind towards the questions raised in the questionnaire.

Pilot study which is considered as the pre-survey level and this helps any researchers to carryout validity test. This expose the methods of cognizing the test guidelines, susceptibility of investigational setting, competence of reestablishing and removing question which are considered to be confusing. This is done by selecting a few people with the interval of 20 to 30 people from the population. We applied same principles by distributing the questionnaire to about 25 people which we later retrieved 16 copies from them.

3.6 Area/Location of the Study

The location of the research is in Turkey focusing on the Turkish Republic of Northern Cyprus as well who's the capital is Nicosia. This is an Island which is officially known as a self-declared state and it is located in the Mediterranean Sea. Northern Cyprus is a self-declared state who run both presidential and democratic system of government. The economy is determined and influenced by the construction

sector and service sector with partially real estate. It is a small and closed economy with international embargo which was a retaliatory act on them due to the official closure of the port in Northern region by the controlling government officials.

Chapter 4

RESULTS AND DISCUSSIONS

4.1 Introduction

In this chapter we run the analyses of our research in stages namely; descriptive statistics, reliability test analysis and regression test analysis. The above-named analyses shaped our opinion towards the findings of this research. It also guided and aided our conclusion which is very insightful and beneficial especially towards the policy implication and the operators of the Cyprus Turkish construction industries.

4.1.1 Descriptive Statistics

The descriptive statistics are done in categories which includes; descriptive statistics of the respondents' demography which include Age, Sex, Names of the companies sampled, positions of the personnel's and their years of experience and this is found in the table appendix A; descriptive statistics of the variables with focus on the responses of the respondents to the questions user each variable (i.e. SCM_Contract, Consequences, Benefits and Barriers) and these appear in Figures 8-11.

Table A as it appears in Appendix shows the descriptive analysis of the demographic section of the questionnaire we used in our study. The analysis shows that 63.3% of the total respondents are male while the 36.7% are females. As regards to the age, 45% of the total respondents fall into the category of 21 to 30 years old while 55% of the total respondents fall into the category of 31 and above years. A total of 65

construction companies were sampled and all of them have the same percentage at 1.7%.

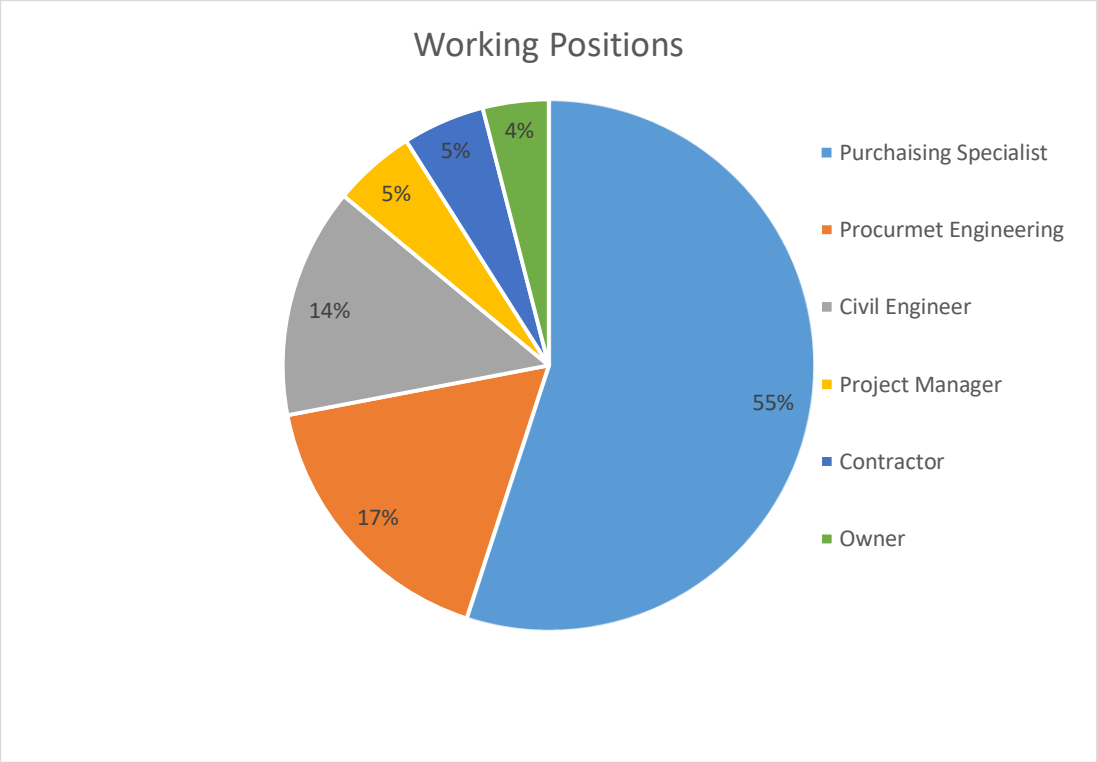

Figure 6: Respondents' Working Positions.

From figure 6 it can be seen that the majority of the respondents are purchasing specialists with highest percentage 55%, while 17% of them were procurement engineers, followed by civil engineers with 14% then with lowest rates project managers, contractors and owner with percentages of 5% and less.

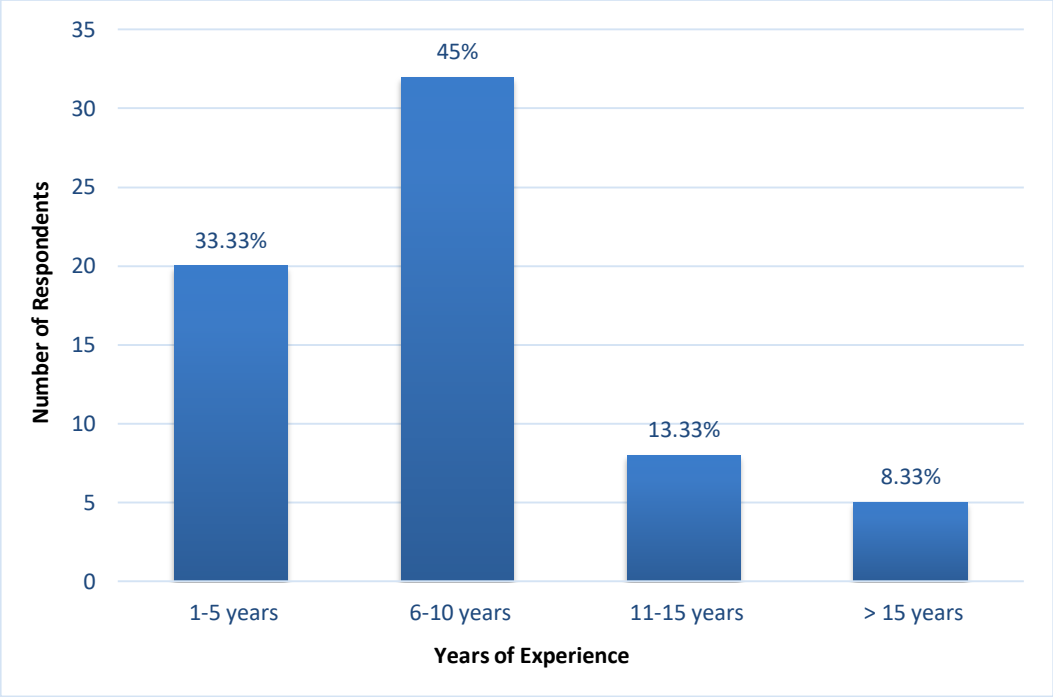

Figure 7: Respondents' Years of Experience.

Figure 7 illustrates the years of experience ranging of the respondents, approximately the half of the respondents' got years of experience varies between 6-10 years, were one-third of them have an experience ranging from 1 to five years. However, respondents who have more than 15 years of experience have the lowest rate percentage of 8.3% of the overall responses. Moreover, the years of experience equally ranges from 2 to 24 years but 8 years is with the highest percent of 15%.

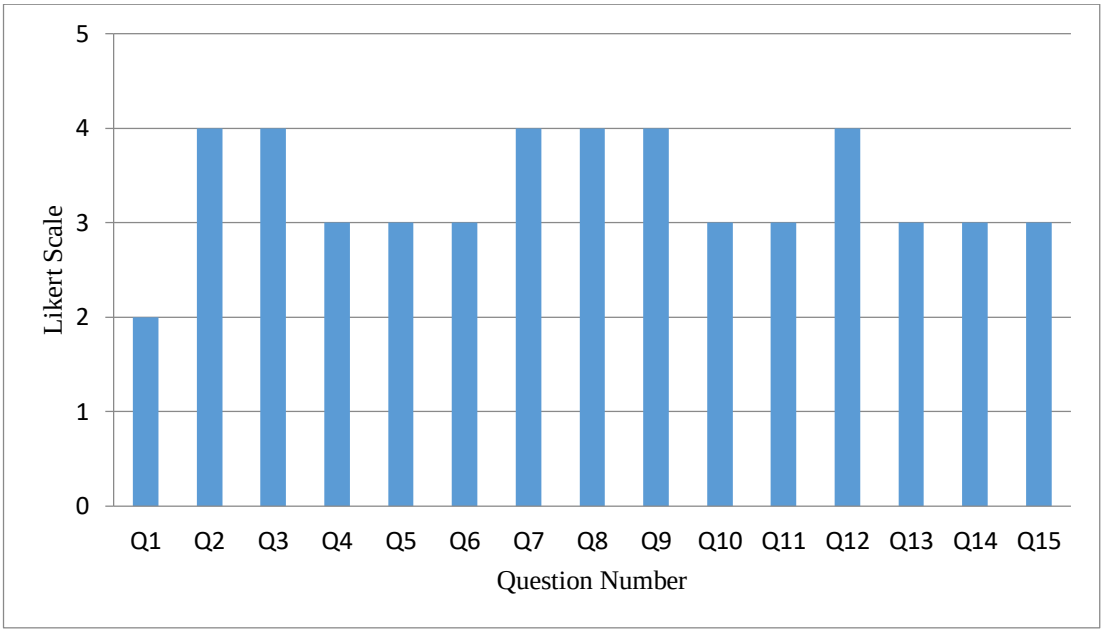

Figure 8: Descriptive statistics Analyses of questions under SCM_Contract.

From Figure 8 we presented a bar chart of the questions under SCM-Contract. The questions are represented in X-axis (i.e. at the foot of the graph) while the numbers in Y-axis are the average(mean) of each question in SCM_Contract. The mean of question one is 2 while questiones two, three, eight, nine and twelfth (Q1, Q2, Q3,Q7, Q8, Q9& Q12) is 4 each, while the mean of questions four, five, six, ten, eleven, thirteen, fourteen and fifteen (Q4, Q5, Q6, Q10, Q11, Q13, Q14& Q15) is 3 each. Each question is differentiated with a unique color and the dots represent questions as can be identified with their colors. There are 15 total question in this variable(SCM_Contrac). When consider the questions individually as done below with answers to the questions in 5-likert scale it shows that most practitioners of the building construction are either not aware of the contract-based SCM or are not using it in their construction business. This is one of our findings in this studies and we dully recommend that government and stakeholders in the business should do well by embarking on a sensitization and awareness on the importance of adopting contract in the construction industries.

SCM_Contract is among the variables coined from our work to drive home the claims on the importance of SCM Contract- based in the implementation of SCM in delivery of building materials and construction in Cyprus Turkish construction industries. From the questionnaire, we have selected questions under SCM_Contract which were framed targeting the rating of the awareness of the practitioners of the industry as regards to contract and its significant in the business. Each question has responses from the respondents which comes in 5-Likert scale such as strongly agree, agree, not sure, disagree and strongly disagree. The author based his descriptive statistics analyses from these responses under each question.

1. Each contract is drafted against the specification made by the client: This question weighs the understanding of the practitioners in Cyprus Turkish construction industry, following the responses, 3.3% of people strongly agree with this question as it regards the construction of a contract, 11.7% of people agree with this question, 28.3% of people declare that they are not sure of this question while 56.7% of people disagree with this questions. From these outcomes, it is observable that the percentage of respondents that said NOT SURE and Disagree with the drafting of the contract are quite much to be compared with those that strongly agree and agree. Hence, we conclude that either they are not using contracts to the operation with the material suppliers.

2. Bid documents from a supplier must include the certification of the company, letter of recommendations relevant to the task at hand, certificates of goods and governing standards: This questions accounts for the documents needed from the supplier in the delivery of building materials which are expected to reflect on the contract. 11.7% of people strongly agree to the question, 68.3% of people agree to the

question, 18.3% of people are not sure of the question while only 1.7% of people disagree with this question. With the number of people who strongly agree and agree, it means that the people in the sector are aware of the required documents from the potential suppliers as to execution of their business. Hence, no much awareness is needed in this documentation but there should be avenue of enlightening the practitioners of the Cyprus Turkish construction industry on contracts.

3. A contractor must supply exactly according to the specifications in the tender document: 10% of people Strongly agree with this question, 60% of people agree with the question, 30% of people state not sure while 10% of people disagree with this question. The number of people who agrees and the ones who are not are tends to be greater, this means that the contractor is expected to meet up with the specifications but due to big number of people who are neutral to this question, it means that they are not sure if the contractor will play by the rule, hence, the need to apply the means of contract that will checkmate deviance rate from the laid down rule.

4. Addendums are drafted in the event of an oversight also make up part of the contract documents: Here, 6.7% of people strongly agree, 46.7% of people agree and not sure while 6.7% of people disagree with this question. Considering the number of people and their percentage in both agree and not sure, we conclude that Addendum may not be popular to the people, this could be because of their myopic knowledge of the contract in the first place**.**

5. The agreed payment terms should be specified within the contract against defined milestones: 16.7% of people Strongly agree to this question, 60% of people agree to this question, 23.3% of people are not sure while 16.7% of people disagree.

This is significant in drafting of a contract and for the majority of the respondent to agree on this, it means the drafting of contract will attract the needed popularity for acceptance and it's a good sign for the easy implementation of SCM.

6. Any other legal documents should be signed by competent representatives of both the client and contractor; 13.3 % of people strongly agree to this question, 66.7% of people agree to this question, with 20 and 13.3% of people respectively are not sure and disagree with the question. The affirmation of 40 people which is the highest number among the respondents shows that the adoption of Contract based SCM in the Turkish construction company will be smooth which will aid the implementation of SCM in the industry.

7. Specification for liquidated damages: This has to do with the measures in ensuring strict adherence to the terms of the business by itemizing the needed compensation when damages are occurred. 5. % of people strongly agree, 30% of people agree with this question, 31.7% and 33.3% of people respectively are not sure and disagree with the question. The number of people that state "not sure" and disagree is a pointer that the respondents are still not familiar with terms of contract, hence, the need for awareness.

8. Conditions for exact delivery time in the contract: 23.3% of people strongly agree, 75% of people agree with this question, 1.7% of people and 23.3% of people are not sure and disagree with the question respectively. The number of people who agree to this question shows that contract will definitely enhance the delivery timing of the building materials when apply to the industry for easy implementation of SCM.

9. There are specifications for the penalty to the defaulters of the contract: 5% strongly agree, 25% of people agree but 43.3% of people are not sure while 26.7% of people disagree with the question. This shows that the practitioners in Turkish construction industry are yet to fully understand and come to terms with contract as shown in the first question. With the majority respondents said not sure while others disagreed with the question.

10. Clarification in the contract about the loading and unloading procedure for materials delivered: 3.3% of people strongly agree, 35% of people agree with this question, while 55% of people and 6.7% of people are not sure and disagree with the question. The big numbers of the people who agree and the ones not sure shows a very big number of people are yet to come to terms with contract and for the ones that understand the concept will massively yield into the adoption of the contract based SCM.

11. The contract has specified major principles or guidelines for handling unanticipated contingencies as they arise: 10% of people strongly agree with the question, 31.7% of people agree with the question, 53.3% of people said not sure while 5% of people disagree with the question. Only a few people disagree with but the majority of people with greater percentage are not sure of the question which means they are not familiar with what the question demanded.

12. The contract has allowed us to respond quickly to match evolving client requirements: 16.7% of people strongly agree to this question, 46.7% of people agree, 28.3% of people are not sure while 8.7% of people disagree. For the majority of people

to agree with this question means that the little introduction of the contract have affects the timely response rate.

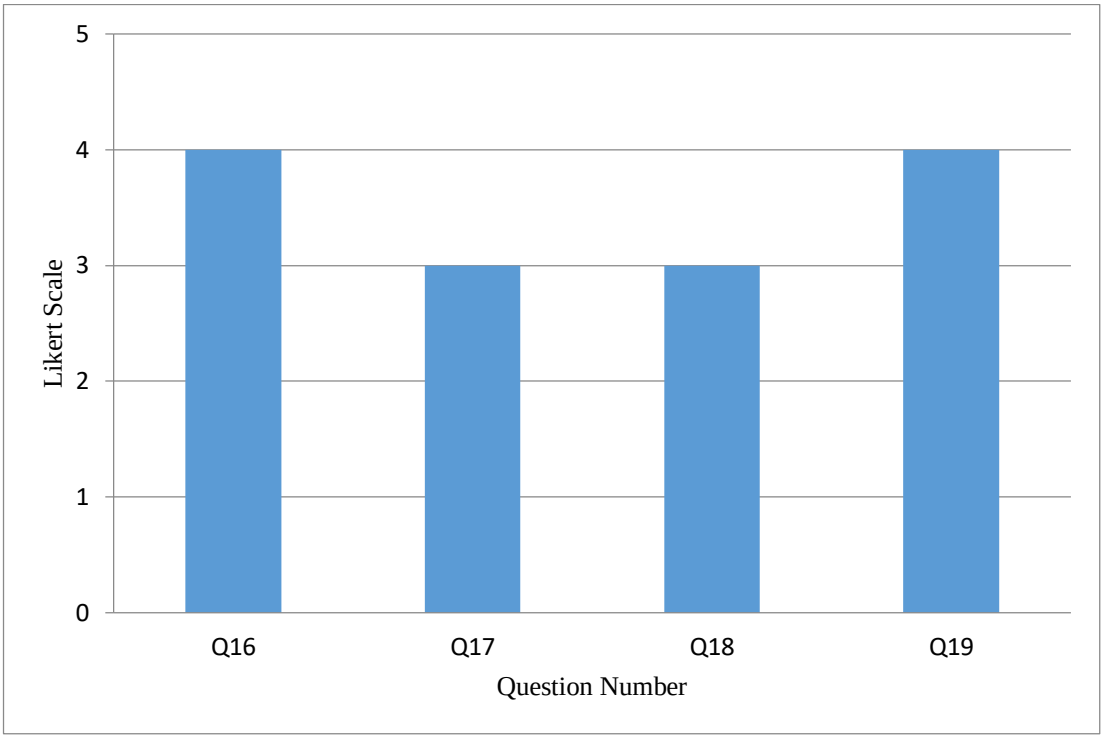

Figure 9: Descriptive Statistics Analyses of Questions Under Consequences.

From Figure 9 we presented a bar chart of the questions under Consequences. The questions are represented in X-axis (i.e. at the foot of the graph) while the numbers in Y-axis are the average(mean) of each question in Consequences. The mean of questions sixteen to eighteen (Q17&Q18) is 3 each, while the mean of questions nineteen (Q16&Q19) is 4 each. Each question is differentiated with a unique color. There are 4 questions in this variable(Consequences). When consider the questions individually as done below with answers to the questions in 5-likert most responses from the respondents shows that those that agree that there are consequences are greater than those who disagree with the hypothesis. Therefore, we conclude in support of our hypothesis that there are consequences of not adopting contract in construction.

Consequences is among the variables coined from our work to drive home the claims on the importance of SCM Contract- based in the implementation of SCM in delivery of building materials and construction in Turkish construction industries. It is used to show if there are consequences of not adopting contract. Also, there are selected questions under this variable to ascertain the consequences of not adopting Contract.

1. It causes delay in delivery of the building materials and delay in project completion: 25% of people strongly agreed to this question, 68.3% of people equally agree to the question, 6.7% of people stated not sure of the question while 25% of people disagreed with this question. The respondents to this question with 41 people in agreement clearly showed that lack of contract in the execution of building projects will evidently delay the completion of each building project.

2. It affects the quality of the building materials and the construction: 30% of people strongly agree to the question, 56.7% of people agree to the question, 13.3% of people are not sure while 30% of people disagree with the question. The response to this question with 86.7% of people in support that lack of contract in the building industry has some consequences.

3. It increases the cost of building: 25% of people strongly agree to this question 58.3% of people agree to this question, 13.3% of people are not sure of the question while only 1 person disagree with the question. For 83.3% of the respondents agree to the questions means that this is among the consequences of lack of contract.

4. It Affects the Loading and Unloading Procedure: 23.3% of people strongly agree with the question, 48.3% of people agree with the question while 28.3% of people

stated not sure. For 71.6% of the respondents to agree to the question means a support that this is among the consequences of not adopting contract in Turkish building industry.

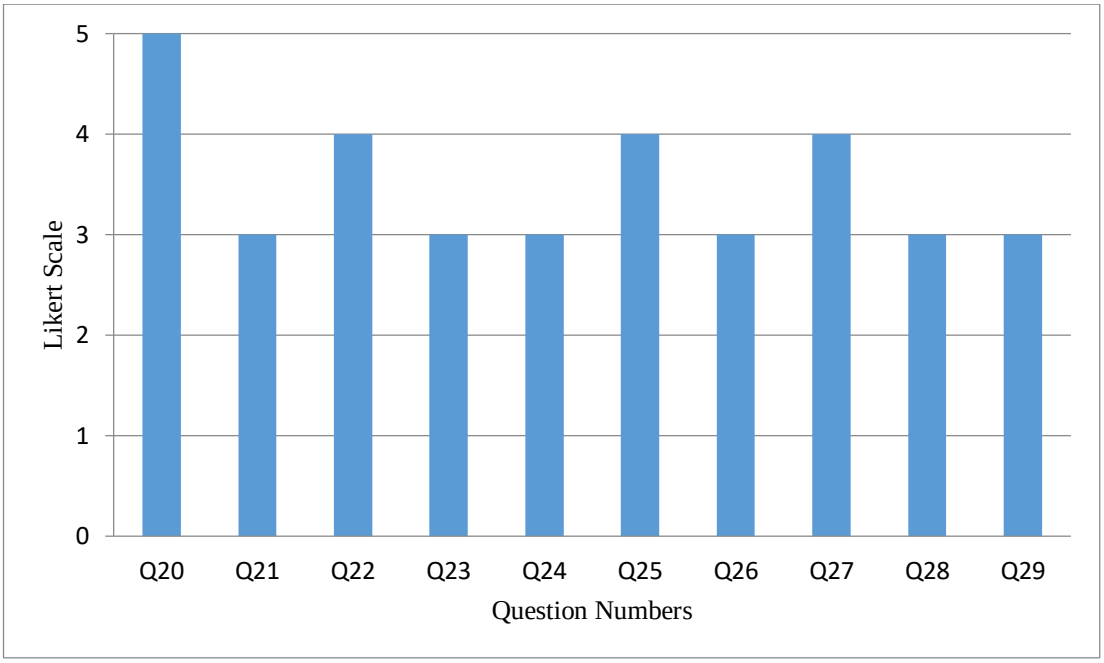

Figure 10: Descript Statistics Analyses of Questions Under Benefits.

From Figure 10 we presented a bar chart of the questions under Benefits. The questions are represented in X-axis (i.e. at the foot of the graph) while the numbers in Y-axis are the average(mean) of each question in Benefits. The mean of question twenty (Q20) is 5, while the mean for questions twenty-one, twenty- three, twenty-four, twenty-six, twenty- eight& twenty-nine (Q21, Q23, Q24, Q26, Q28& Q29) is 3 each, Also, the mean of questions twenty-two, twenty- five & twenty-seven (Q22, Q25, & Q27) is 4 each. Each question is differentiated with a unique color and the dots represent questions as can be identified with their colors. There are 10 total question in this variable(Benefits). When consider the questions individually as done below with answers to the questions in 5-likert scale it depicts from the responses of the group that agree are the greatest among all the responses garnered from the questions under

Benefits. We therefore, conclude by supporting the hypothesis that adopting contract-based SCM is beneficial to the parties involved in the construction industry, and the Turkish practitioners should emulate this practice.

Benefits is among the variables coined from our work to drive home the claims on the importance of SCM Contract- based in the implementation of SCM in delivery of building materials and construction in Turkish construction industries. It is used to show if there are benefits of adopting contract. Also, there are selected questions under this variable to ascertain the benefits of adopting Contract.

1. It reduces the delay in delivery of materials: 16.7% strongly agree with the question, 71.7% of people agree to the question, 8.3% of people are not sure of the question, while 1 person each disagree, and strongly disagree with the question respectively. Where 87.14% of the respondents are in support of the question means that this is among the benefits of adopting contract in Turkish building industry.

2. It enhances the trust between the suppliers and contractors: 10% of people strongly agree with the question, 15. % of people agree with the question, 61.7% of people are not sure while 13.3% of people disagree with this question. Obviously, from this response with 74.10% not in agreement with the questions means that the issue of trust does not lies only on contract.

3. It reduces the amount of complaints from the parties: 6.7% of people strongly agree 10% of people agree with the question, 41.7% of people are not sure with the question, 40 % of people disagree with the question while only 1 person with 1.7% strongly disagree with the question. The responses on this question with 81.14% seems

to disagree with this as among the benefits of adopting contract. Complain is part of human nature which goes beyond contract and this could be among the reasons of not agreeing with it as among the benefit.

4. It enhances accurate order fulfillment without shortage: 6.7% of people strongly agree with the question, 28.3% of people agree with the question, 53.3% of people are not sure if it is true, 11.7% of people disagree with the question. Looking at the sample questions, 64.10% disagree with the question which is an indication that this falls out of the benefits of adopting contract.

5. It reduces the delay in completion of building: 11.7% of people strongly agree to this question, 61.7% of people agree with this question, 20% of people are not sure if it is among the benefits, 6.7 % of people disagree with this question. In all, we can conclude that one of the benefits of adopting contract is the ability to reduce the delay in completion of the building.

6. It reduces the cheating in the supplying of the materials: 3.3% of people strongly agree, 20% of people agree, 30% of people are not sure if it is true, 46.7% of people disagree. With the responses from this sample, it is not clear if this is among the benefits of adopting contract as about 76.7% are not sure and disagree with this point.

7. It helps in speedy loading and offloading of the materials: 6.7 % of people strongly agree with this, 36.7% of people agree with this question, 48.3% of people are not sure if this is among the benefits, 8.3% of people disagree with this point. This also is a signal that majority of the respondents with 56.6 % are not in support of this as a benefit of adopting contract.

8. It helps in maintaining good quality materials: 5% of people strongly agree with this question, 76.7% of people agree with this, 16.7% of people are not sure of this as among the benefits, 1.7% of people disagree on this point as well. For 81.7% people to have agreed on this as among the benefits of adopting contract, it is considered a valid point and thereby accepting maintenance of good quality as among the benefits of adopting contract.

9. It helps in maintaining good quality of services: 6.7% of people strongly agree to this, 60% of people agree with this as well, 31.7% of people are not sure if this is among the benefits, 1.7% of people disagree with this opinion. By way of considering the percentage of the responses we conclude with 66.7% that good quality of service is among the benefits of adopting contract.

10. It creates room for equity in the transactional relationship between supplier and contractor: 8.3% of people strongly agree with this point, 33.3% of people agree to the point, 51.7% of people are not sure if this is among the benefits, 6.7% are in disagreement with the point. From the sample responses with 57.14% is higher and are not in agreement with this point as among the benefits of adopting contract.

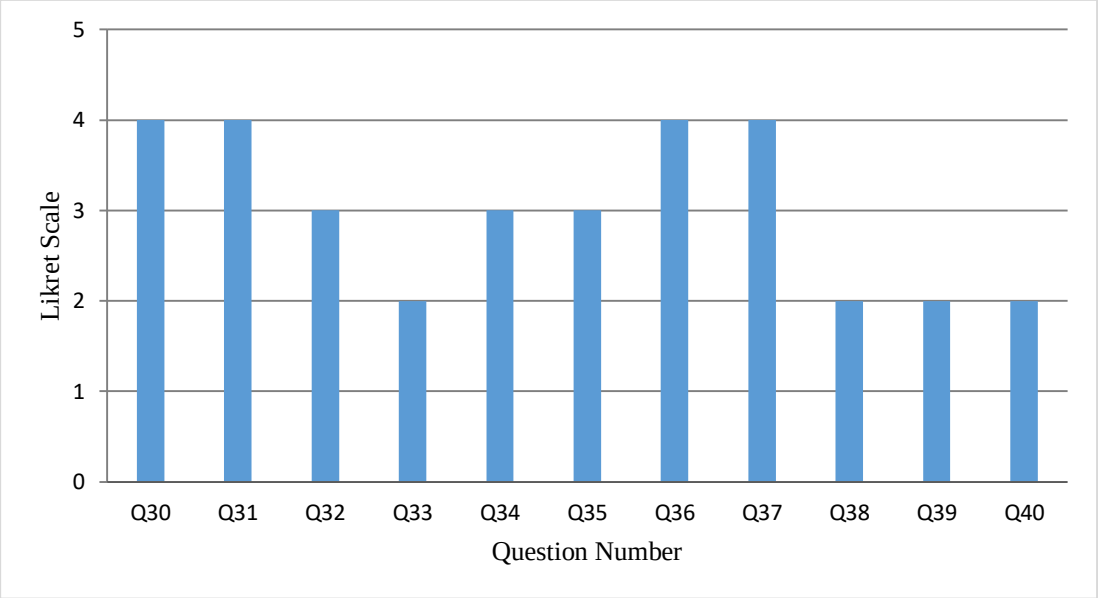

Figure 11: Descript Statistics Analyses of Questions Under Barriers.

From Figure 11 we presented a bar chart of the questions under Barriers. The questions are represented in X-axis (i.e. at the foot of the graph) while the numbers in Y-axis are the average(mean) of each question in Barriers. The mean of questions thirty, thirty-one & thirty-six & thirty-seven (Q30, Q31, Q36 & Q37) is 4 each, while the mean for questions thirty-three, thirty-eight, thirty-nine & forty (Q33, Q38, Q39 & Q40) is 2 each, Also, the mean of questions thirty-two, thirty-four & thirty-five (Q32, Q34 & Q35) is 3 each. Each question is differentiated with a unique color and the dots represent questions as can be identified with their colors. There are 11 total question in this variable (Barriers). When consider the questions individually as done below with answers to the questions in 5-likert scale it depicts from the responses of the group that agree are the greatest among all the responses garnered from the questions under Barriers. The result analyzed the respondents' views on whether there are barriers that will make the adoption of contract difficult.

Barriers are among the variables coined from our work to drive home the claims on the importance of SCM Contract- based in the implementation of SCM in delivery of

building materials and construction in Turkish construction industries. It is used to show if there are barriers of adopting contract. Also, there are selected questions under this variable to ascertain the barriers of adopting Contract.

1. Lack of understanding of the contract in SCM concept: 85% of people strongly agree to this as among the barriers of not adopting contract in their building business, 11.7% of people also agree, 1.7% of people respectively are not and disagree with this point. The outcome of the respondents with 96.7% shows that it is among the barriers.

2. Lack of information on the importance of the contract-based SCM concept: 76.7% of people strongly agree with this, 16.7% of people agree with this point also, while 3.3% of people are not sure and disagree with this as a barrier. Considering the percentage of the respondents in agreement with this points, we conclude that lack of information is among the barriers.

3. Low commitment of the partners: 21.7% of people strongly agree, 38.3% of people agree with this point as a barrier, 36.7% of people are not sure while 3.3% of people disagree with the point. Hence, we conclude that low commitment is among the barriers with 59.10% agreed to the point.

4. Lack of legal enforcement by the government: 65% of people strongly agree, 16.7% of people agree with this point, 13.3% of people are not sure if this is among the barriers, 5% of people are not in agreement. From these responses we conclude that lack of legal enforcement is among the barriers with 82.7% agreed respondent.

5. Presence of sub-contractors: 20% of people strongly agree, 26.7% of people agree with this point, 45% of people are not sure of this question while 8.3% of people are not in agreement with this. Percentage of people who are not sure and disagree with this point is bigger with the ones that agree with it, so we conclude that this is not among the barriers.

6. Financial/cost related problem: 5% of people strongly agree with this point, 38.3% of people agree with this point also, 35% of people are not of this point while 21.7% of people disagree with this point. We conclude that this is not probably among the obstacles as 56.7% did not agree with this claim against 43.3% people agreed.

7. Lack of trust of keeping to the rules by the parties: 3.3% of people strongly agree with this point, 26.7% of people agree with this point also, 41.7% of people are not of this point while 26.7% of people disagree with this point and 1.7% of people strongly disagree. We conclude that this is not probably among the obstacles as 68.21.7% did not agree with this claim against 29.10% people agreed.

8. Lack of legal / consultants: 3.3% of people strongly agree with this point, 18.3% of people agree with this point also, 18.3% of people are not of this point while 55% of people disagree with this point and 5% of people strongly disagreed. We conclude that this is not probably among the obstacles as 78.3% did not agree with this claim against 21.6% people agreed.

9. Lack of interest to contract-based SCM by the suppliers: 38.3% of people strongly agree with this point, 41.7% of people agree with this point also, 3.3% of people are not of this point while 16.7 % of people disagree with this point. We

conclude that this is probably among the obstacles as 79.10% agree with this claim against 19.10% people did not agree.

10. Constant change in the organizational structure: 30. % of people strongly agree with this point, 68.3% of people agree with this point also, 1.7% of people are not sure of this point. We conclude that this is probably among the obstacles as 98.3% agree with this claim against 1.7% people did not agree.

11. Lack of cooperation by the top management to the idea of contract-based SCM: 27 people with 45. % strongly agree with this point, 31 people with 51.7% agree with this point also, 1 person with 1.7% are not sure of this point. We conclude that this is probably among the obstacles as 96.7% agree with this claim against 1.7% people did not agree.

4.1.2 Reliability Test

Whenever any study involves estimation of a model, it is very important to check for the reliability of the scale especially when Likert questions are involved. This is a Cronbach Alpha test which measures the internal consistency or reliability of a data set. It is among the approaches to test the suitability of a data set for statistical analysis. The baseline for the acceptable range of Cronbach Alpha is when the number is between 0.7 and upward such as 0.8 (Cortina, J.M 1993). In this present study, we tested for the reliability of the data set and found the result of 0.81 and 0.86 which is very good and portray a good data set for this statistical analysis. The output is seen below from the Table 2.

Table 2: Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.808	.856	40

4.1.3 Regression Test

The regression marks the final estimation in this research which are of two categories, hence, linear and ordered logistic regressions. The need for the regression in our study is to validate and authenticate the results gotten from the descriptive statistics. Regression always gives a researcher a leverage in establishing a linear relationship among the choice variables and interpret the outcome in such a manner that it will aid the researcher to give credence to his hypothesis in the study. Our linear regression comes with; mode summary table; Anova and Coefficients table. The mode summary Table explains the R-square and the Adjusted R-square. R –square gives insight the variations and fittings in the model of the research work. It is presumed that higher deviation is explained by the regression's the better the fitted line. But this does not really mean that Low R-square is totally bad especially in a study that involves human responses as it relates to their predictions. In some cases, it is even better when the R-square is even below 50% (.50). This work is a typical example of such analyses that does not demand or need much higher R-SQUARE. Hence, the Model summary table is presented below.

Table 3: Model Summary

Model	R	R-square	Adjusted R-square	Estimated standard error
1	.604	.364	.329	5.42833

Predictors: (Constant-SCM Contract), Barriers, Consequences and Benefits.

The R-square and the Adjusted R-square are 0.36 and 0.33. The next table are the ANOVA and the coefficients tables which shows the results of the regressions with p-values in determination of the statistical significance and insignificance of the estimations and equally shows the relationship (negative or positive) that exist among the choice variables.

Table 4: ANOVA Result

Model	Sum of Squares	df	Mean square	F-statistics	Prob. (Sig)
Regression	925.975	3	308.658	10.4075	0.0004
Residual	1620.671	55	29.467		
Total	2546.644	58			

a. Predictors: (Constant-SCM Contract), Barriers, Consequences and Benefits
b. Dependent Variable: SCM-Contract.

Table 5: Regression Test of the Coefficients

Model	Standardized Coefficients	T-statistic	Prob(sig)
	Beta		
(Constant)		3.274	.002
Consequences	.101	.912	.0366
Benefits	.635	5.412	.000
Barriers	-.1250	-.9211	.039

Dependent Variable: SCM-Contract

Both the ANOVA and the regression tests exhibits prominent results considering the significant level of the variables and the positive nature of the beta and the slopes**.** The ANOVA result displayed in Table 7 above shows that the regression is significant at .000 of the p-value. The regression test of the coefficient shows that all the variables are significant. The slopes (the unstandardized and standardized coefficients) are all in positive except the Barrier which happens to show the negative sign and this is as the author expect it. It shows the negative relationship that exist among the dependent variable (**SCM-Contract**) and the Independent variable (**Barrier**). The results of the regression tests of the coefficients could be interpreted with the help of the hypothesis which are outline as follows;

H1. Contract is very significant in Implementation of SCM in material delivery of the Cyprus Turkish construction industry;

H2. The contract based SCM in the Turkish construction industry has some significant Benefits;

H3. There are barriers in adapting contract based SCM in Turkish construction industry based;

H4. There are Consequences of not adapting contract based SCM in the construction industry.

The interpretation of the regression with focus on the above hypothesis are as follows;

1. SCM-Contract

H1. Contract is very significant in Implementation of SCM in material delivery of the Turkish construction industry;

The ANOVA regression shows that the regression is highly significant at .000 of the p-value. The slope from the constant is with a positive relationship and significant at even 1% significant level. With this result we fail to reject our null hypothesis (**H1**) and conclude that Contract is very significant in implementing SCM in material delivery of the Turkish construction industry.

2. Benefits

H2. The contract based SCM in the Turkish construction industry has some significant Benefits;

ANOVA shows the significance of the regression at .000 of the p-value. The slopes (the unstandardized and standardized coefficient) on the regression table are all positive at 1.037 and .635 with p-value of .000 which shows that the benefit as a variable is positive with contract and significant at 1 percent level. This result can be seen as a one percent increase in contract will lead to .64 percent increase in the benefits of adopting the contract based SCM in Turkish construction company and this support the hypothesis (**H2**).

3. Barriers

H3. Limiting barrier in adapting contract based SCM in Turkish construction industry based will be favourable in implementation of the SCM;

The slopes are all negative at -.542 and -.250 with p-value of .039 which shows that the barriers as a variable has a negative relationship with contract and at a significant level of 0.039. This means that a one percent increase in barriers limiting the adoption of contract will lead to the .25 percent decrease in adopting contract which will limit the implementation of SCM in delivery of construction materials, also, a one percent decrease in barriers will lead to .25 percent increase in application of the contract. We conclude that when the barriers are limited or reduced it will lead to favourable implementation of contract- based SCM.

4. Consequences

H4: There are significant Consequences of not adapting contract based SCM in the construction industry;

The slopes are all positive at .200 and .101 with p-value of .0366 which shows that the consequences as a variable has a significant positive relationship with contract at .0366. This outcome concludes that the negligence of SCM_Contract based will have a great impact on the process of SCM, since it will cause a delay in delivery of building's materials with subsequently will delay the completion of the project, thus, this will lead to an increment of the project overall cost.

Chapter 5

DEVELOPING CONCEPTUAL FRAMEWORK FOR SCM CONTRACT-BASED

This chapter provides conceptual framework for adopting SCM contract-based between contractors and material suppliers by the researcher. Since the value of the materials that is required to be purchase in building construction is approximately 40% of the overall cost of the construction process. Thus, materials purchasing and inventory management has a big influence on a project's cash flow (Pilcher 1992). The main idea of this framework is to present significant conditions which has to be mentioned in the procurement contract while purchasing materials.

In the performed questionnaire in Cyprus Turkish construction industry, the majority of the companies pointed out they don’t use contract which contains terms of buying materials. Therefore, the gesture of this study conduct a framework of the essential terms need to be mentioned in the contract, then the benefits of contracts if exists, consequences of contract negligence and the barriers of implementing the contract. Thus, the framework was designed into 3 phases based on highest mean values of the descriptive analysis of the respondents for each question in the questionnaire.

5.1 Phase 1: Essential Terms of Procurement Contract

Since there are many kind scripts for contractual agreements used in the construction industry, based on the respondents' answers, the researcher highlights the main clauses need to be presented in the contract in order to guarantee that material procurement won't obstruct the supply chain process of the project as well as will not affect the cost negatively.

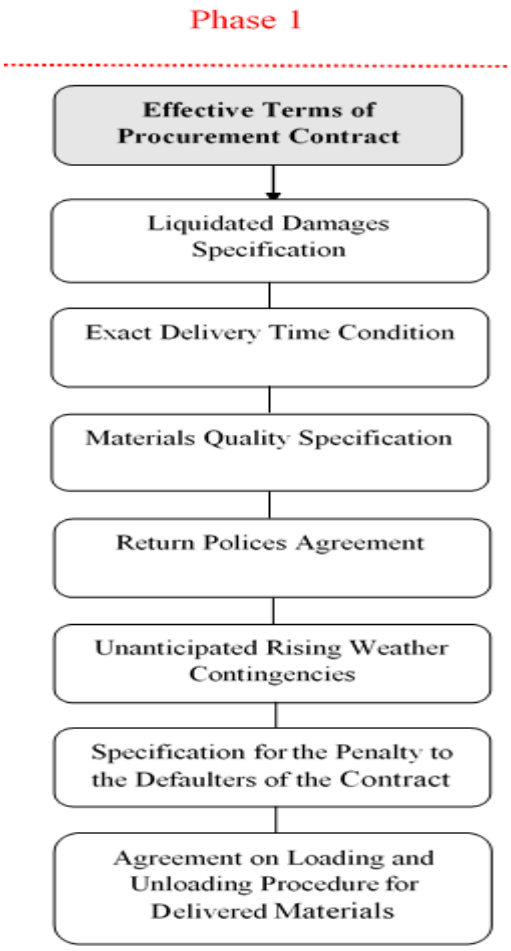

Figure 12: Important Clauses in Procurement Contract.

From figure 12, liquidated damage is presented in the framework, which is an establishment to measure and compensate the damage when a party of the contract fails to comply on the task which causes a breach (Peckar, R. S. 1972).

In the liquidated damage clause, according to the respondents' answers highlighting on the flowing certainties and clauses in the framework essentially need to be enclosed in the contract in order to protect the contractor where disorder occurs. Specifically, for the exact date of materials delivery so when the suppliers fail to so liquidated damage clause assures a deduction of payment for each day or working day, this is not a penalty as much as it is a guarantee of compensation the state of increased time in the administering contract (Crowley, 2008).

In the flow of the contract clauses, the results of the study showed that respondents signified the importance of including specifications of the materials to be purchased in the contract, subsequently the return policy of the materials where there is a variation between the specified material's in the contract and the delivered materials.

Since contractors in Cyprus Turkish construction industry expressed that there are no written contracts between suppliers which is a significant factor obstructs the supply chain management in that region. Therefore, after specifying the parties and their responsibility so it binds to sides together, then the contractor will pay the money accordingly, they also signified that a condition which specifies duration, loading and unloading process have to be mentioned in the contract.

5.2 Phase 2: Contractual Significant Benefits

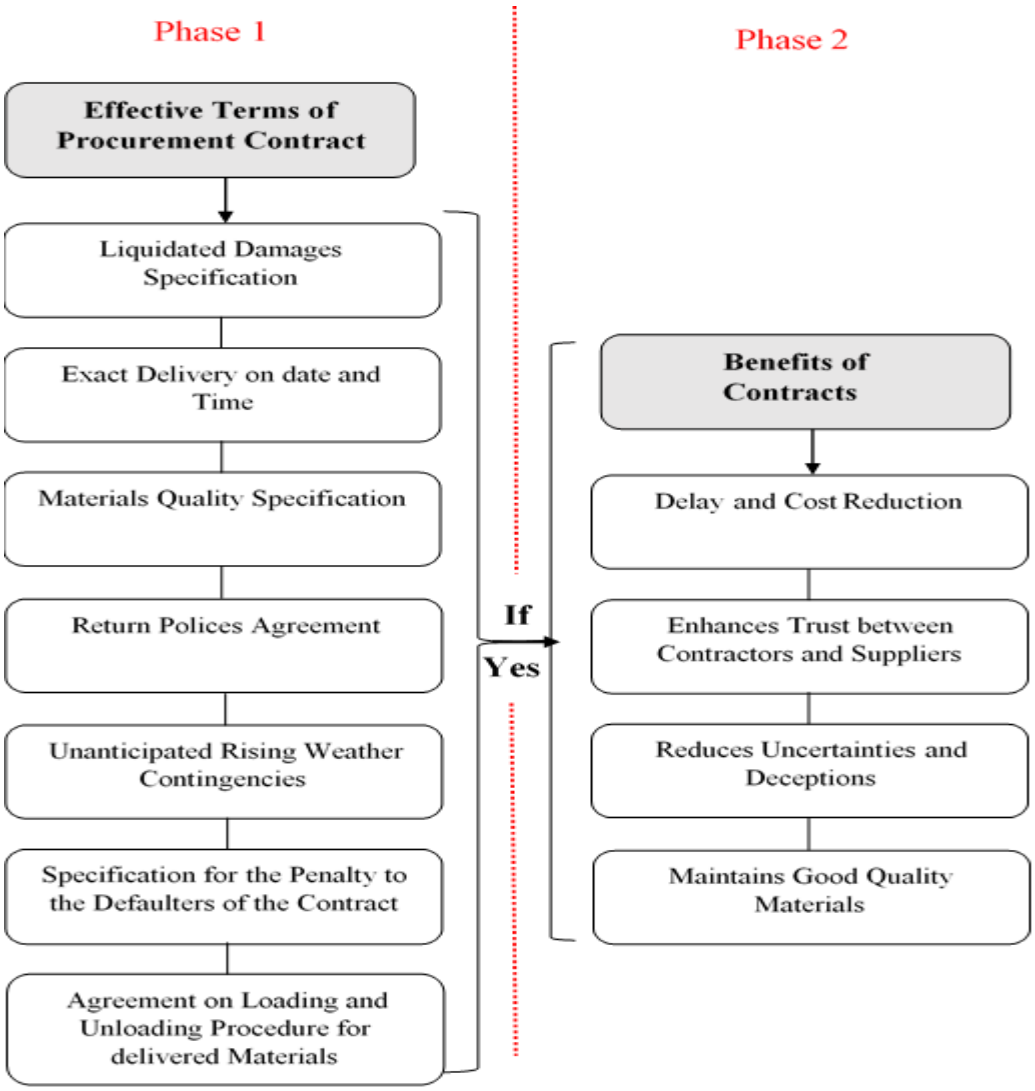

Figure 13: Benefits of Implementing Contract for Materials Order.

Among the responses of the questionnaire, contractors declared that if there is a valid contract with material suppliers, it will lead to attain benefits outcome which sustains the supply chain process. This is more motivation on adopting of contract, which noticeably reduces uncertainties, deception, delay and cost for contractor, it also enhances trust between the parties of the contract for acquiring good material quality. Without strong motivation to work in the interest of clients, there will no need to adopt the contract-based SCM (Chirag and Bhavin, 2015).

5.3 Phase 3: Contract Negligence Consequences and Barriers of implementation

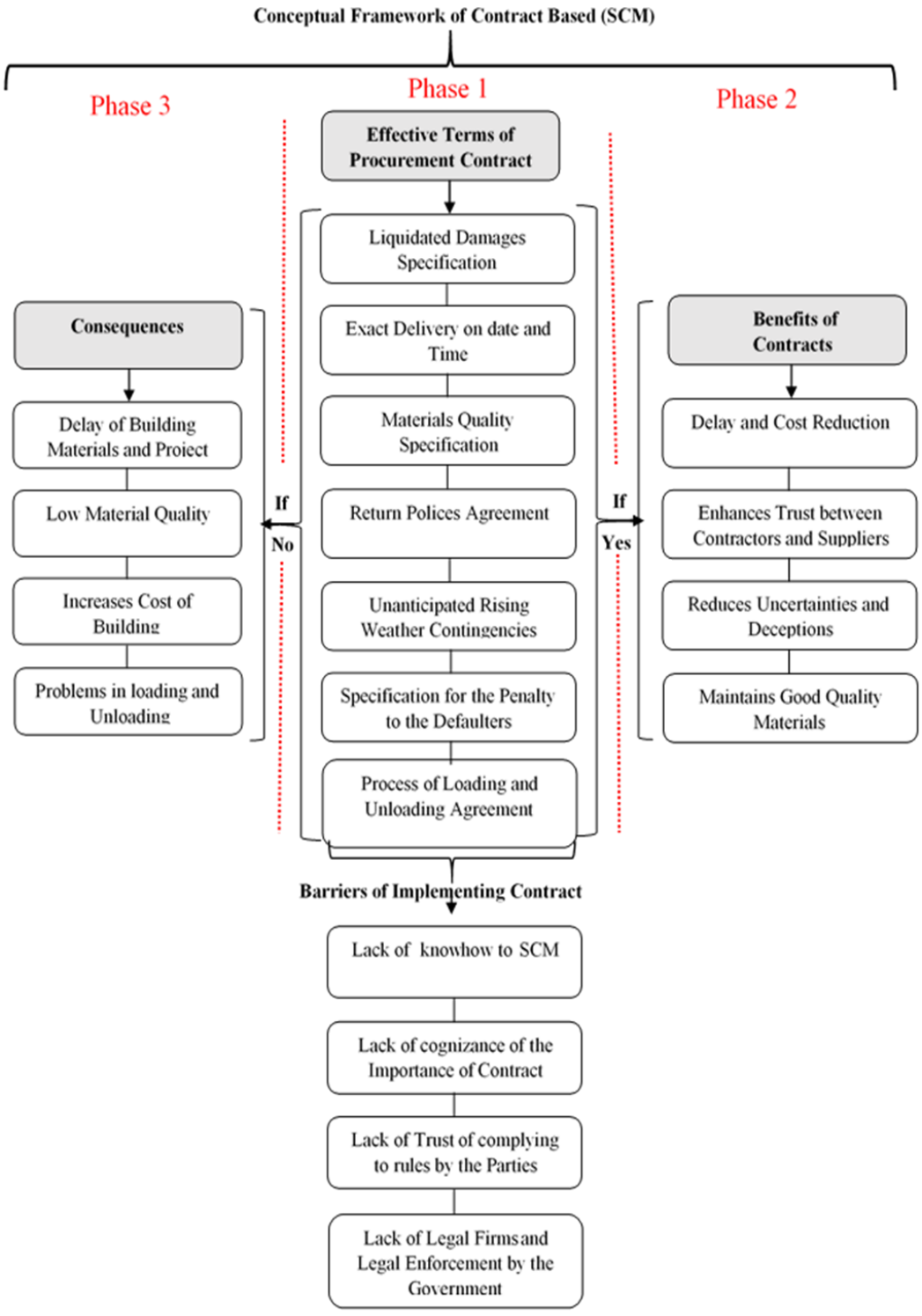

Figure 14: Conceptual Framework of Contract-Based SCM.

Figure 14 shows the final shape of the frame work developed for this study, Because the work focuses in examining the impact of contract-based SCM in construction, consequences of ignoring written contract are enclosed to the framework in accordance to the signification of respondents of the effective ones. Therefore, the failure of adopting contract-based SCM might lead to negative effects to the contractor's work which will cause up delay of building material delivery, delay in project completion which subsequently increases the building process cost, low quality with deviation of the specified quality by the owner and misleading in the (loading and unloading) process (Arrow, 1968). 10.

As much as there are many contractual benefits, it is totally free from some obstacles that can hinder the full implementation. In the practical perspectives, the benefits of SCM provided may not be that easy to achieve, the framework shows some barriers in Cyprus Turkish construction industry to the implementations coexist with the benefits of the contract, such as lack of understanding the concept of supply chain management or the importance of written contracts between material suppliers. Also lack of legal firms in the industry causes a hindrance of implementing contracts particularly when there is no governmental enforcement to provide contractual documents of material procurement in every construction project (Akintoye et al. 2000; Vrijhoef et al. 2001; Dianty et al. 2001).

Chapter 6

CONCLUSION AND RECOMMENDATIONS

The study is centered on examining the effects of the contract-base supply chain management (SCM) in Cyprus Turkish construction industry. We did this with focus on the effective procurement and supply of building materials with the help of a valid written contract which we hypothesized that it will aid the effective implementation of SCM in Cyprus Turkish construction industry. The author came up with a questionnaire which was used in gathering a firsthand data (primary data). Also, in attempt to scientifically buttress our claims we came up with hypothesis based on the chosen variables. The choice variables are SCM-Contract, Consequences, Benefits and Barriers. In other to attend to the hypothesized frameworks around the choice variables, we utilized SPSS to do some estimations ranging from descriptive statistics to the final regression and we found amazing and interesting results which are all in support of the expectations of the researcher in this study.

Among the hypothesis and the expectations of the author is that introduction of the contract based SCM is significant and will enhance the implementation of SCM in Turkish and Northern Cyprus construction industries as it regards to easy delivery of building materials. Our findings both from descriptive, correlation and regression test attest to this fact in agreement with positive and significant results gotten from our estimations. See table 2 and the appendix for correlation table for easy assimilation of our claim. Also, we maintained that it is beneficial to adopt the contract based SCM in

execution of building materials in construction industries. Our findings support this hypothesis with the results in the above-mentioned tables where the variable benefits portray a positive with significant outcomes with contract in both correlation and regression test. This suggests that the adopting a written contract in implementation of SCM in the Cyprus Turkish construction industries will be of high benefits to the practitioners. The barriers and consequences are also among the hypothesized variables and our findings support each of the hypothesis. All the hypothesis is fully geared towards the supports of the expectations of the researcher that adopting a written contract in the implementation of SCM in delivery of building materials with enhance the Turkish construction sector.

In conclusion, from the findings of this research work, we found that a contract based SCM in the Cyprus Turkish construction industry is non-negotiable while executing the construction project in the entire country. We therefore, recommend that the officials and the handlers of the Cyprus Turkish construction should look into making the application of contract-based SCM in the construction sector.

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APPPENDICES

Appendix A: Descriptive Statistics Analyses of the Variables

Variables	Observations	Minimum	Maximum	Mean	Std. Deviation
SCM_Contract	60	18.00	49.00	35.6000	6.58504
Consequence	60	4.00	28.00	7.9667	3.34444
Benefits	60	14.00	34.00	25.6833	4.02741
Barriers	59	14.00	29.00	23.1356	3.05387

Appendix B: Correlations Analyses of the Variables

Construct		Cont.	Conseq.	Benefit	Barriers
SCM_Cont.	Pearson Correlation	1	.147	.549**	.018
	Sig. (2-tailed)		.262	.000	.890
	N	60	60	60	59
Consequence	Pearson Correlation	.147	1	.177	.214
	Sig. (2-tailed)	.262		.177	.104
	N	60	60	60	59
Benefits	Pearson Correlation	.549**	.177	1	.389**
	Sig. (2-tailed)	.000	.177		.002
	N	60	60	60	59
Barriers	Pearson Correlation	.018	.214	.389**	1
	Sig. (2-tailed)	.890	.104	.002	
	N	59	59	59	59

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

Appendix C: Questionnaire

((Examining the importance of contract-based Supply Chain Management (SCM) in Cyprus Turkish Construction Industry: Interest on building materials))

Dear Respondent,

My name is **Yazan Dannoun** I am a master's student in the Civil Engineering Department at Eastern Mediterranean University (EMU) in Famagusta Cyprus. In the delimitation of my thesis, the purpose is to evaluate the factors that affect the Supply Chain Management (**SCM**) in Turkish Construction Industry and to make comparison among the various firms/companies in the industry. Please, kindly attempt to answer all the questions sincerely and do note that any information given in this questionnaire will be treated confidentially.

Demographics

1. Gender: Male: ☐ Female: ☐
2. Age: 18 – 20 ☐ 21 – 30 ☐ 31 ☐ and older
3. Name of company: ☐
4. Position Occupied: ☐
5. Years of Experience: ☐

To evaluate best approach of implementing SCM in Turkish construction industry with focus on the effective procurement and supply of building materials with a valid written contract. we need your response to the following questions below

Item	Strongly Agree 1	Agree 2	Not Sure 3	Disagree 4	Strongly disagree 5
A) Contract					
1. Each Contract is drafted against the specification made by the Client.					
2. Bid Documents from a Supplier must include the certification of the company, letter of recommendations relevant to the task at hand, certificates of goods and governing standards.					

3. Bid Document must include a bill of quantities (quotation) and timeframe					
4. A contractor must supply exactly according to the specifications in the tender document					
5. The Agreed payment terms should be specified within the contract against defined milestones					
6. Addendums are drafted in the event of an oversight also make up part of the contract documents					
7. Any other legal documents should be signed by competent representatives of both the Client and Contractor.					
Item	**Strongly Agree 1**	**Agree 2**	**Not Sure 3**	**Disagree 4**	**Strongly disagree 5**
8. Specification for liquidated damages					
9. Conditions for exact delivery time in the contract					
10. Condition for the material quality and specifications					
11. Conditions for return policies in the contract					
12. There are specifications for the penalty to the defaulters of the contract.					
13.Clarification in the contract about the loading and unloading procedure for materials delivered					
14. The contract has specified major principles or guidelines for handling unanticipated contingencies as they arise					
15. The contract has allowed us to respond quickly to match evolving client requirements					
B) Consequences of negligence of Contract in the implementation of SCM in the supply of Materials (Consequences)					
Among the **CONSEQUENCES of negligence** of the Contract in the SCM implementation are:					
16. It causes delay in delivery of the building materials and delay in project completion					
17. It affects the quality of the building materials and the construction					
18. It increases the cost of building					

19. It affects the loading and unloading procedures					
C) Benefits of Contract in the implementation of SCM in the supply of Materials (BENEFITS)					
Among the **BENEFITS** of the Contract in the SCM implementation are:					
20. It reduces the delay in delivery of Materials					
21. It enhances the trust between the suppliers and contractors					
22. It reduces the amount of Complaints from the parties					
23. It enhances accurate order fulfillment without shortage					
24. It reduces the delay in completion of building					
25. It reduces the cheating in the supplying of the Materials					
26. It helps in speedy loading and offloading of the materials					
27. It helps in maintaining good quality materials					
28. It helps in maintaining good quality of services					
29. It creates room for equity in the transactional relationship between supplier and contractor					
D) **Barriers of efficient implementation of SMC in Turkey construction industry (BARRIER)**					
Among the **BARRIER** of efficient implementation of SMC in Turkey construction industry are:					
30. Lack of understanding of the contract in SCM concept					
31. Lack of information on the importance of the contract-based SCM concept					
32. Low commitment of the partners					
33. Lack of legal enforcement by the government					
34.presence of sub-contractors					
35. Financial/cost related problem					
36. Lack of trust of keeping to the rules by the parties					
37. Lack of legal firms /Consultants					

38. Lack of interest to Contract-based SCM by the Suppliers					
39. Constant change in the organizational structure					
40. Lack of cooperation by the Top management to the idea of contract-based SCM					