

INVESTIGATION OF SUPPLY CHAIN MANAGEMENT IN CONSTRUCTION COMPANIES

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ABSTRACT - This project is aimed to focus towards the adoption and implementation of supply chain management (SCM) in Construction Industries in Tamilnadu. The findings are based on literature review and views of construction companies based in Tamilnadu. The research focuses to explore and investigate different problems which might affect the supply chain management (SCM) process in the built environment industry, in particular, the construction companies in the Tamilnadu. Concepts and definitions of supply chain management (SCM) diverge from logistics, management of distribution channels from suppliers to end users, to good relationship with business partners. In building and construction industry (BCI) SCM deals with management of materials and information and financial flows between contractors, designers and clients. SCM is a tool to build the authentic relationship and collaboration among suppliers and the different stakeholders of the organization and hence it improves the inventory visibility and velocity in terms of innovation that is essential for construction engineering and projects. The research also focuses to look at the different approaches and to understand the difference between modern supply chain concept and traditional approach of management. A survey in the form of a questionnaire was distributed amongst fifty top construction Companies in Tamilnadu, thus ensuring sampling diversity. It not only highlights valuable data but also views of their supply chain departments.

Key words: Supply Chain Management, Difference b/w Traditional Management and Supply Chain Management.

I. INTRODUCTION

The Supply chain management (SCM) is a concept that has originated in the manufacturing industry to control logistics. It represents a management process by which enterprises administer and control the worldwide network of suppliers, factories, warehouses, distribution centers and retailers through which raw materials are acquired, transformed and delivered to customers. In construction, procurement and procurement related activities occur during all phases of a construction project. Because of inevitable complexity and fragmentation of the construction process, supplies of resources like equipment, labor, material and other services

may not be always available on time, in right amounts and in the desired quality and price. An overall management process like supply chain management is essential to monitor and control all such logistic activities.

The concept of supply chain management in construction outlining its origins in manufacturing is introduced in this paper. The effectiveness of the supply chain management has been evaluated with its potential benefits to the construction industry. A list of possible barriers, which may affect the application of supply chain management concept in the construction industry, has also been presented. Finally, a simplified model for supply chain management in the construction industry is presented.

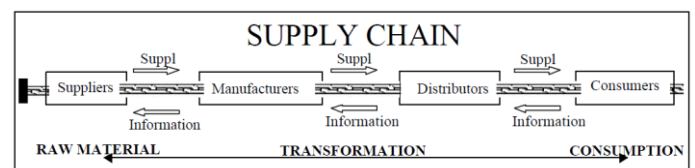


Fig. 1.1 Supply Chain Visualization

In Fig. 1.1 an example of a very simple supply chain for a single product is shown. In this case, raw material is procured from vendors, transformed into finished goods in a single step, and then transported to distribution centers, and ultimately to customers. However, the realistic supply chains have multiple end products with shared components, facilities and capacities. SCM looks across the entire supply chain, rather than just at the next entity or level, and aims to increase transparency and alignment of the supply chain's coordination and configuration, regardless of functional or corporate boundaries (Cooper and Ellram, 1993).

Traditionally, marketing, distribution, planning, manufacturing, and the purchasing organizations along the supply chain operate independently. These organizations have their own objectives and that are often conflicting. This traditional way of managing is essentially based on a conversion (or transformation) view on production, whereas SCM is based on a flow view of production. The conversion view suggests that each stage of production is controlled

independently, whereas, the flow view focuses on the control of the total flow of production.

Supply Chain Management in Construction

All the Engineers, construction managers and contractors do not typically consider the supply chain or SCM, they deal with the supply chain and make SCM decisions on a daily basis. In construction, supply chain refers to the end-to-end “chain” of stakeholders and partners that come together both on individual projects and during a firm’s business life. In a project, a supply chain includes the owner, planner, designer, architect, engineer, construction manager, general contractor, subcontractors, suppliers, distributors, and manufacturers. Throughout a firm’s business life, components of a supply chain may also include accounting, human resources, equipment fleet operations, etc.

Within the construction project, the supply chain can be simply conceived with the owner at the top followed by designer, contractor, specialist contractors/subcontractors/suppliers etc., forming various levels of supply chain. Demand can be seen as flowing down the chain in terms of information, e.g. project briefs, drawings, schedules, works orders etc, with a flow of goods and materials flowing in the opposite direction (McCaffer and Root 2000).

However, the management of this supply chain is often problematic due to the fragmentation in the construction industry; increasing complexity of the projects and the demand for greater performance at lower costs from the clients. These problems have led the stakeholders to become more actively involved in the project life cycle.

The authors have proposed a simplified model for the application of supply chain management concept in construction, which is shown in Fig. 1.2.

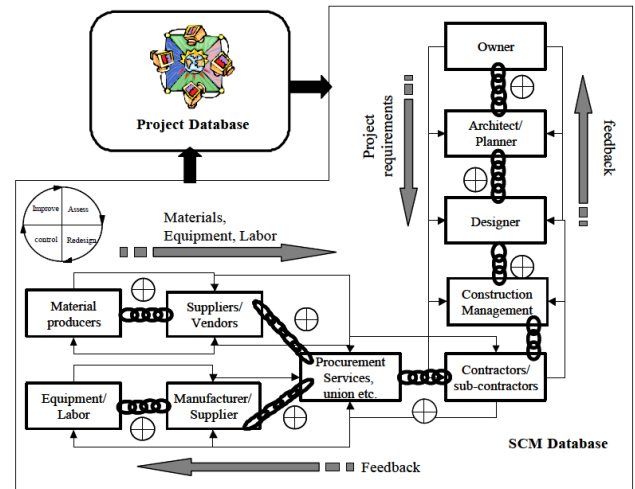


Fig.1.2 Simplified Supply Chain Management Model for the Construction Industry.

This model divides the construction process into two major processes,

- (i) The procurement process; and
- (ii) The construction services process.

The procurement process deals with the supply of materials, equipment and labor to the construction site. The stakeholders in this process are the material producers, equipment manufacturers, the wholesalers, suppliers or vendors, labor unions, the contractors and the subcontractors. The chain in this process can be termed as ‘procurement chain’.

The construction services process essentially consists of clients, architects, designers, construction manager, contractors and the sub-contractors and the so formed chain can be named as construction chain. The project requirements move across the construction chain in the form of project briefs, schedule and budget as explained earlier. The model proposes that all the supply chain activities are managed through a separate SCM database, which should be linked with the central project database. Only with this level of support, one can plan and control the complexity of construction processes and projects.

II. BACKGROUND STUDY

Literature reviews of research work published over the last five years were taken to study.

Jiamei Ren (2012) expects to improve the administration of supply frameworks in development industry utilizing lean

standards. This study is an endeavor to recognize what sort of exercises causes' development procedure postponement and how to perform incline idea into inventory network practically speaking. The goal is to guarantee on-time conveyance of data and materials to development destinations at least cost and greatest quality for the client. These study issues have been broke down from a lean development production network viewpoint, focusing on diminishing and wiping out non-esteem adding exercises keeping in mind the end goal to most extreme the quality for the client. Supply many-sided quality in development to better comprehend which areas are anything but difficult to produce non-esteem including exercises.

Cheung Yan Ki Fiona (2011), intends to investigate the relationship between social contracting structures and methodologies and inventory network manageability in the structural designing development industry. It attempts to reveal insight into the practices and essentials for relationship administration execution achievement and for supply maintainability to create. The examination philosophy is a triangulated methodology in light of Cheung's (2006) prior exploration where poll study, meetings and contextual analyses were directed. This new research incorporates an eye to eye poll study that was done with 100 experts from 27 contracting associations in Queensland from June 2008 to January 2009. A subsequent study sub-poll, further looking at task participants' points of view was sent to an alternate gathering of experts (as recognized in the fundamental survey overview). Measurable investigation including different relapse, relationship, main segment component examination and investigation of fluctuation were utilized to recognize the hidden measurements and test the connections among variables. Meetings and contextual analyses were directed to help in giving a deeper seeing and also clarifying discoveries of the quantitative study.

Aslihan Karataş, (2009) the relationship between foremen, their suppliers and customers has been researched to uncover the level of significance of SCM from the perspective of builders. The individual sentiments of the builders have additionally been examined to acquire individual information on the subject. This study points of interest the aftereffects of a survey overview of production network administration connected to US development industry foremen haphazardly chose among US development industry builders. From the outcomes got, a few arrangements can be proposed for the viable utilization of SCM for ideal development execution and in addition accentuating some significant focuses evading ideal productivity and benefit in the development business

III. OBJECTIVES OF THE STUDY

The main objectives of the study are

- To identify the problems while transferring the materials from place of origin to place of usage.
- To find out the way of cost reduction of materials.
- To satisfy the customer requirements by filling the efforts of supply chain management.

IV. RESEARCH METHODOLOGY

The questionnaire preparation began with a review of relevant materials from journals and industrial experts. Finally questionnaire template is prepared comprising two components. First part consists of demographic details, company details and project details. Second part consists of 6 Critical Risk Group (CRG) with 10 Critical Risk Factors (CRF) affecting Supply Chain Management in Construction projects. The survey was conducted with various construction companies. Questionnaires were sent to various respondents such as project manager, project engineer and assistant engineer from Private Construction Organizations.

The survey is conducted by asking the field experts to rate the 57 Critical Risk Factors on five point scale. Data were collected from different experts in Construction projects. The scale ratings are as follows No effect, Very Low, Low, moderate and very high. Data were analyzed using statistical tool and factors were measured and ranked using mean impact index.

V. RESULTS AND DISCUSSION

In this chapter, the results of the questionnaires are presented and discussed. The chapter illustrates and discusses the characteristics of the current construction materials supply chain management, contractor-supplier relationship, some concepts that mitigate the uncertainties and risks in the construction industry which affects the supply chain in the construction industry are discussed here.

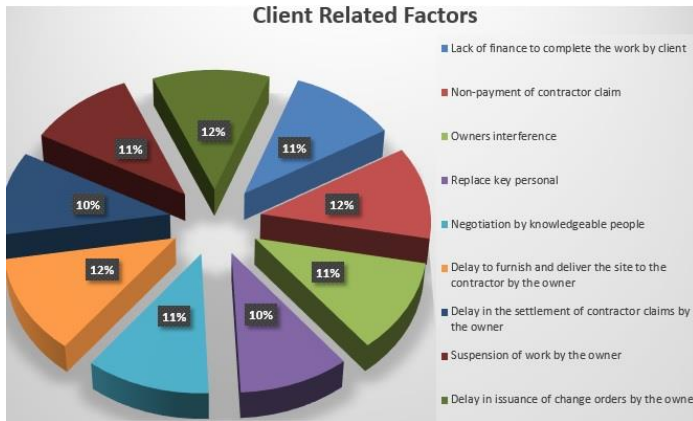


Fig.4.1 Client Related Factors

The above Fig. 4.1 explains, how client related factors affects the supply chain management in construction. It is found that the majority of people think that delay to furnish and deliver the site to the contractor by the owner and delay of payment by the client are the major problems for the supply chain process and it was affected 13.82%, 13.29% clearly shown in the graph.

The technique used for to reduce the problem is Visualization Analysis. Visualizing data for exploratory data analysis hampers the breakthrough of effectively and efficiently analyzing data thereby assisting the management function and enhancing project performance. This technique considers both the “quantitative dimension” and “non-quantitative dimension”. The non-quantitative dimensions includes major group element, location, reason of change, initiated document, and approved date and the quantitative dimensions include total of trade’s change order amount and projected change order cost.

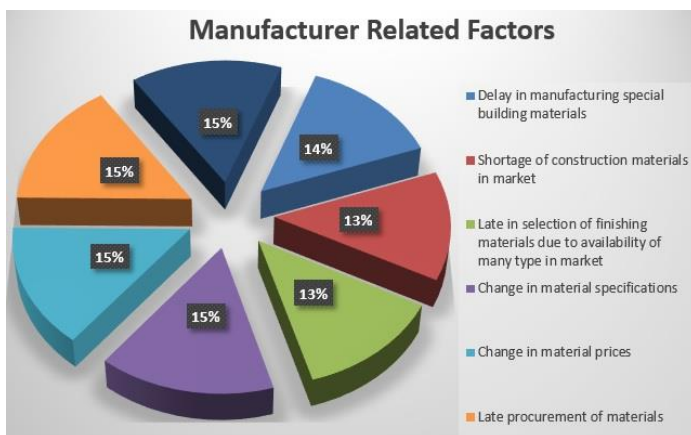


Fig.4.2 Manufacturer Related Factors

The above Fig. 4.2 explains, how manufacturer related factors affects the supply chain management in construction. The major causes that will affect the supply chain process are late procurement of materials, Change in the material specifications and late procurement of materials which is in the percentage of 15.44%, 15.07% and 14.89%.

Technique Used for to reduce these problem is - Shipment Tracking System. A tool for creating inventory transparency based on shipment tracking. It is designed for site inventories and short-term storages. The tool is established by tracking the incoming shipments (materials received at the site / warehouse) and outgoing materials (materials installed / sent from the warehouse). A task number or an identifying code is given to the inventory transparency wherein the codes are registered with a tracking system. When packages arrive or deliver from a storage location, the location and time of the inventory can be tracked easily using the tracking software.



Fig.4.3 Consultant Related Factors

The above Fig. 4.3 explains, how consultant related factors affects the supply chain management in construction. It is found that major causes which affect the supply chain process is replacement of key personal. To reduce this causes the following necessary step should be taken in the project. Qualified personnel should be selected before rejecting the present key personnel. A new person should be aware about the details and specifications of the project before he is going start a work. And the following technique used for to reduce the inspection delay.

Delay Time Modeling: A modeling tool is created to model the problems of inspection maintenance and planned maintenance interventions. The inspection consists of a check list of activities to be undertaken, and a general inspection of the operational state of the plant. The interaction between inspection and equipment performance may be captured

using the delay time concept. Any defect identified leads to immediate repair, and the objective of the inspection is to minimize operational downtime. Other objectives could be considered, for example cost, availability or output.

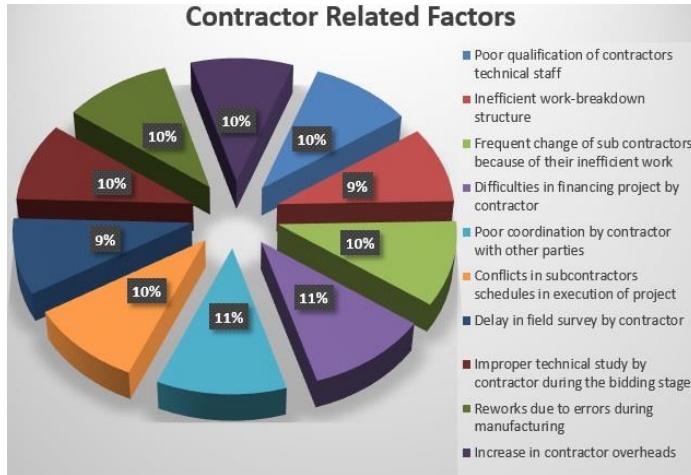


Fig.4.4 Contractor Related Factors

The above Fig. 4.4 explains, how contractor related factors affects the supply chain management in construction. It is found that the major causes that were affected the supply chain process is poor coordination by contractor with other parties with the percentage of 12.29. To reduce this problem the contractors should take the following steps. Establish internet-based communication system to integrate the involved parties in the estimation process and enabling them to have an access to project data and to share project information. Use special forms for data sharing and communication. And build good relationship with the owners, Suppliers and subcontractors based on trust and exchange of information.

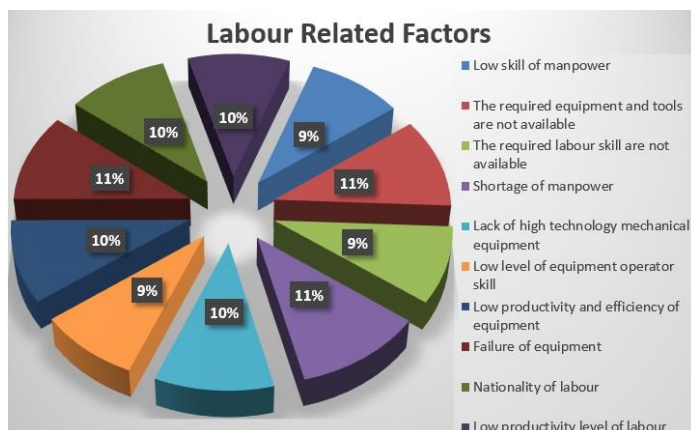


Fig.4.5 Labor Related Factors

The above Fig. 4.5 explains, how labor related factors affects the supply chain management in construction. It is found that there are two major causes which affect the supply chain process among the 10 causes with the percentage of 11.21 and 10.76. The techniques used for to reduce these causes is Planning and Scheduling using MS Office Project

It is a project management software program, designed in developing a plan, assigning resources to tasks, tracking progress, managing the budget, and analyzing workloads. Each resource can be assigned to multiple tasks in multiple plans and each task can be assigned multiple resources, and the application schedules task work based on the resource availability as defined in the resource calendars. All resources can be defined in label without limit. This application helps in identifying the problems occurred due to the manpower, shortage of equipments and materials.

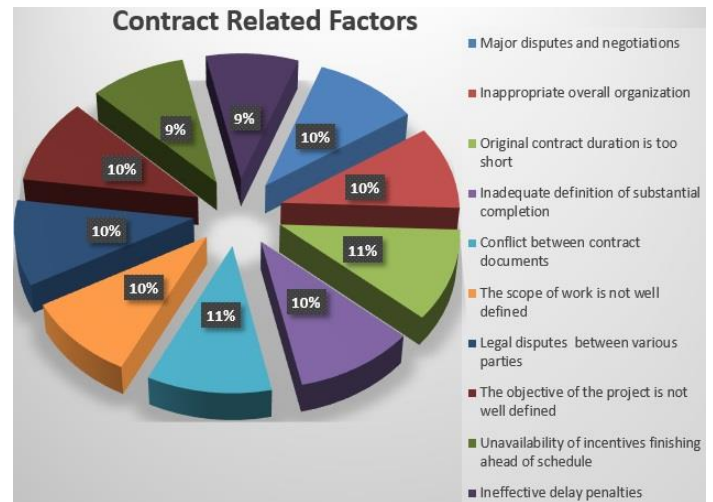


Fig.4.6 Contract Related Factors

The above Fig. 4.6 explains, how contract related factors affects the supply chain management in construction. In that there are two major causes in the percentage of 11.84 and 11.65. To avoid these problems the following necessary step should be taken before going for a project.

During the bidding stage itself the contractor documents should satisfy all the members (contractors, client, owners, and sub-contractor). Improve their communication with the suppliers via using special forms. Use website information system for transferring the information. Stipulate that suppliers have to attach with their offers brochures and / or technical data for the materials that they are going to deliver and anyone who does not adhere to this condition, his offer will be rejected.

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