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Supply Chain Management: Effective Tool in Construction Industry

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Abstract: **Supply Chain Management is recognized as a leading process improvement, cost saving and revenue enhancing business strategy. It applies to all businesses involved in the delivery of construction projects. Supply Chain Management requires a corporate initiative, supported by strategic and tactical planning, to instill systems thinking and promote a new discipline that companies must master. Construction Projects Supply Chain Management requires a good understanding of production management; planning, design, and construction; and business drivers like other disciplines within an organization, such as structural, mechanical, electrical, or process engineering, accounting and materials management. Supply Chain Management must have a champion who can drive the ideas across disciplines within the organization as well as across organizational boundaries.**

Keywords: **Supply chain management (SCM), construction supply chain, collaboration, bench marking (BM), total quality management(TQM), Customer Relationship Management(CRM).**

I. INTRODUCTION

Construction industry is the second largest economic activity in India. Indian Construction Industry can be divided into three market segments: Infrastructure, Industrial and Real Estate. Infrastructure constitutes of roads, ports, airports, irrigation, railway, and power projects etc. In the Indian context, it is estimated that 1% growth in infrastructure yields a cascading effect of 2.5% growth of GDP. There is a massive investment flow into the infrastructural development in India and other Asian countries. Looking at the ubiquitous construction activity in the country and strong future prospects, it is important to devise the strategies to enhance the productivity in construction activity which seems to lag far behind in comparison to other manufacturing and service industries.

In the lack of construction firms' initiative for higher productivity and better quality, construction industry has seen commoditization; where contracts are awarded on the basis of minimum bid. This in turn has reduced the profit margins and industry players have been averse of making investments for productivity enhancement. Current firm-specific cost reduction doesn't confer any sustainable advantage in the global market. With the increasing global competition, Indian firms need to involve all the stakeholders of the construction supply chain who influence the productivity of the project. This is possible only through greater coordination among various players. Firms need to follow a supply chain approach to achieve global standards. Rising revenues of construction industry and strong future prospects would encourage construction firms to make investments to achieve higher productivity.

The issue of delays, cost over-runs and quality non-conformance is closely related to the Supply Chain Management (SCM) and we believe that applying SCM principles, Use of Information Technology (IT) and supply chain integration can bring significant increase in the productivity in construction projects.

II. SUPPLY CHAIN MANAGEMENT

SCM tries to achieve more than just planning of product and information flow; and it also aims at connecting and synchronizing the processes of other inter-related organisations such as the client, suppliers and customers.

"SCM is an innovative and revolutionary managerial approach which involves a working culture change and a voluntary initiated agreement for integration and synchronization of two or more inter-dependent members within variety of

organization level and boundaries as well as range of inter-linked construction life-cycle processes (initiation to handover). It promotes joint effort and strategy on all activities which are underpinned by mutual trust, responsibility, benefit and risk sharing based on a long-term perspective on relationship. Value is achieved through optimization and management of processes, resources, core competencies, talent, information, power and technology within the supply chain towards accomplishment of a set of shared objective and goals, enhance competitive advantage, breaking down any discontinuities and meeting distinctive client needs. Consequently, jointly agreed benchmarks, targets, expectation and values are put in place for continuous improvement efforts and are supported by aligned incentive schemes towards sustaining the endeavor".

2.1 Managing supply chains in construction:

SCM has become increasingly popular in construction literature and practice, and a number of SCM initiatives have been launched. Together with related concepts such as lean thinking, JIT and partnering, SCM is suggested as a promising means for improving construction performance the main idea being that supply chain processes should be integrated in order to provide better customer value (Latham,1994; Egan, 1998; Strategic Forum, 2002).However, in line with the general SCM literature suggesting that the implementation of SCM practices might pose a number of challenges (see Bask and Juga, 2001; Jahre and Fabbe-Costes, 2005), SCM is considered to be especially problematic in relation to the construction industry (Briscoe and Dainty, 2005; Fearne and Fowler, 2006; Fernie and Thorpe, 2007). Both SCM and lean construction have been criticized for their vague terminology and rhetoric and lack of interest in more critical scrutiny of the sectors for which the concepts were originally developed (Winch, 2003; Green and May, 2003; Green et al., 2005). This has further been proposed as an explanation for slow adoption as well as a lack of ability to provide the promised benefits.

Hence, there is a need for further scrutiny and understanding of applications of the concept in this industry. In the following, we inquire into how supply chains, and in particular supply chain integration, are viewed in the construction literature, first through a review of construction literature with regard to supply chain integration, then by discussing different interdependencies in and between construction supply chains.

2.2 Principles underpinning supply chain management:

Supply chain management is actually concerned with more than the movement of materials from point to point. However, there are some principles attached to the use of supply chain management posited by Handfield and Nichols (2002: 6).These principles are described as follows:

- The only entity that injects money into a supply chain is the end customer. That is until the client initiates a procurement process, the supply remains idle;

- The solution that is stable over the long term is one in which every element of the supply chain, from raw material to end customer, profits from the process. It is short sighted for businesses to believe they can solve their cost problems by punishing suppliers and customers. Shifting costs and problems without solving root causes is inherently unstable and mostly unsuccessful over the long term. The best supply chains will solve problems, implement the best solutions, and share the benefits among their members

- Supply chain management is about economic value added. Supply chain management is not just about cost reduction. It"s about the total content of a final product or service, including quality, technology, delivery, and after-sales service. It"s about managing the total process and ultimately meeting the needs of the client. The integrated management of information and materials across the supply chain offers the benefits of increasing the value-added by supply chain members, removing waste, reducing cost, and improving customer satisfaction (Handfield and Nichols, 2002: 32).

- In the same sense, Pryke (2002: 17) suggests that the observation of construction project governance through the analysis of transactions classified broadly into information exchange, performance incentives and contractual relationships, provides benefits in relation to clarity and quantification, particularly as procurement methods move away from the traditional contracting system previously prevalent in the construction industry.

- Therefore supply chain managers strive to achieve the ideas of fully integrated and effective supply chains ,capable of creating and sustaining competitive advantage.(Christopher and Towill, 2002 cited by Christopher and Peck, 2004: 1).

- To this end they must balance downward cost pressures and need for efficiency, with effective means to manage the demands of market-driven service needs and the known risks of routine supply chain failures (Christopher and Peck, 2004: 1).

2.3 Benefits of Supply Chain Management:

Following are the benefits of effective SCM:

- Transparency, trust and efficiency in the management of the supply chain present benefits to all parties involved in project delivery:
- Clients can develop improved ability to identify strengths, weaknesses, opportunities and threats in the chain, and increased value for money and efficiency;
- Contractors can access improved early and continuous communications with clients and stakeholders, and a more competitive subcontractor base offering better skills, expertise, innovation and value for money, and
- Subcontractors can engender improved communication with contractors and assurance of continuity in business.

2.4 The Role of Supply chain in Construction Industry:

The manufacturing industry is the pioneer industry which introduces the concept of SCM as a new and important tool to perform the business process in a systematic and well defined way to save time, enhance quality and realize profit Tan, (2001). The construction industry SCM processes are scattered and are partially adopted. The building and construction industry can be divided into three main categories: building construction; heavy engineering construction and trade construction. While building construction can be further divided into residential and non-residential for example commercial and industrial building. Akintoye et.al. (2000) conducted a survey on supply chain management in UK construction industry and they argue that there exists partnership relationship among contractors, suppliers and clients; they only focus on the production planning and purchasing factors for the SCM process in construction industry and lists the barriers which can hindrance the successful process of SCM in construction industry. Vrijhoef and Koskela (2000) discussed four roles of supply chain management as described in the fig. 1. These four roles in construction industry can be recognized based on the focus of the industry either construction site or supply chain or even both. The authors claimed these roles have major impact on the construction industry.

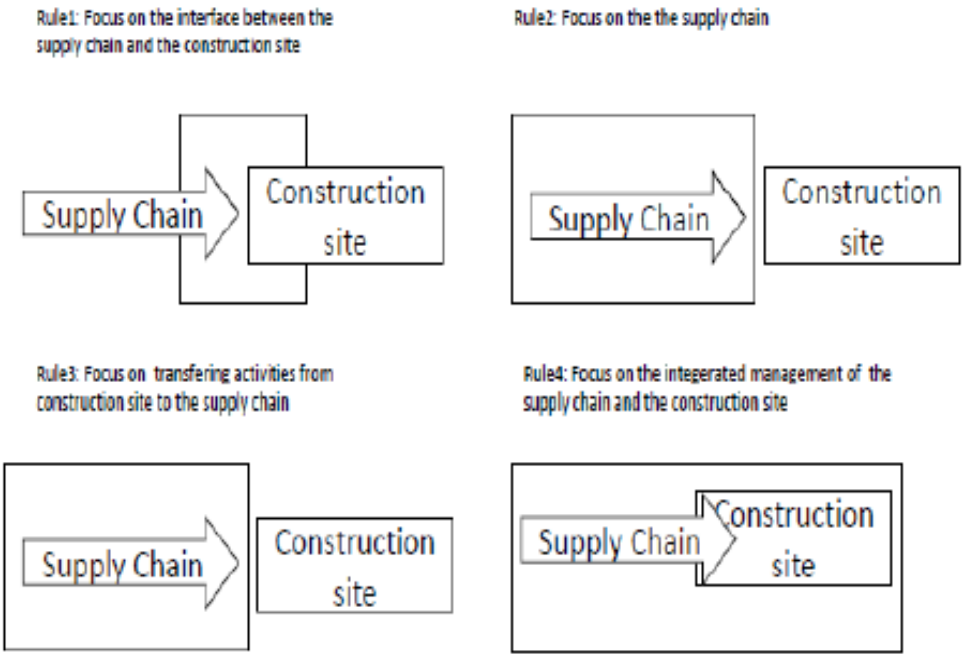

Fig. 1 Four Role of SCM in Construction Industry (Vrijhoef and Koskela :2000)

For example rule 1 focus on the interface between the supply chain and the construction site, the main impact of this is to reduce the costs and duration of site activities. These four roles does not seems to be mutually exclusive, while in practice these four roles are simultaneously applied to the supply chains in order to improve the efficiency of SCM processes. Welling and Kamann (2001) suggest that building and construction industry supply chains can be at firm level or project level. The firm level can provide stable and long term supply chains on the other hand project level supply chain are mostly temporary because their durations are already fixed. Love et.al (2002) identified the partnership relationship related to the alliances, which can be either strategic or project based. The project based alliances are more towards short term alliances for the temporary projects while the strategic alliances focuses on the long term partnership relationship for the large projects and the alliance is based on more than one project. Hence the partnership relationship plays vital role in building and construction industry which develops the trust and commitment. Saad et.al.(2002) provides a review on the adoption of SCM in construction industry and suggest that construction experts has some knowledge of SCM, but still they need more attention towards the implementation of SCM by increasing their conceptual understanding and how new SCM can be implemented systematically. Briscoe and Dainty (2005) recommended the most common characteristics for structural projects for the construction industry, which make hindrances to make fully utilize of supply chain in construction projects, for example one-off projects, the project which are located on different sites (i.e geographically dispersed) and also the high fragmentation, which is a natural characteristic of any construction project, Khalfan et.al (2007) presents the different views on the building trust among supply chain participants in the construction projects. El-Saboni e.al. (2007) and El-Saboni e.al.(2009) investigates the success of the construction projects in UAE are based on modern electronic communication management system. They provide a state of art on the usage of modern communication technologies in construction industry and also they investigate how these modern system influence the relationship of different project team members.Ali.et.al. (2010) studies the performance of construction projects in Malaysia; their research is based on quantitative data collection and through questionnaire surveys. In addition, they argue that Malaysian industry is still infancy to adopt the partnering approach their partnering approach is still local based this may be due to the influence of the culture. Soemardi et.al.(2007) explains the application of SCM in the Indonesian construction industry. They argue that the SCM processes in Indonesian construction industry are still in infancy or the SCM processes are not adopted at all. However their study is starting points towards the application of SCM in Indonesian construction industry, there still need more research in this area. Barkhi and Daghfous (2009) study shows the application of TQM, SCM and CRM implementations in the UAE hotels. UAE also attracts tourist in the, with increase of tourist in the UAE, hotel managements four to five star category hotels have realized the benefits of the supply chain management. This case is a unique case and has relevance to the application of SCM in a UAE industry. Fig. 2 shows the qualifications and consequences of TQM, CRM and SCM implementation in UAE hotel industry. From the implementation it has been clearly identified that SCM increases the operation efficiency, so it does not only provide relationship management with the contractor and supplier but has an overall impact on the efficiency of the services delivered by the hotel management.

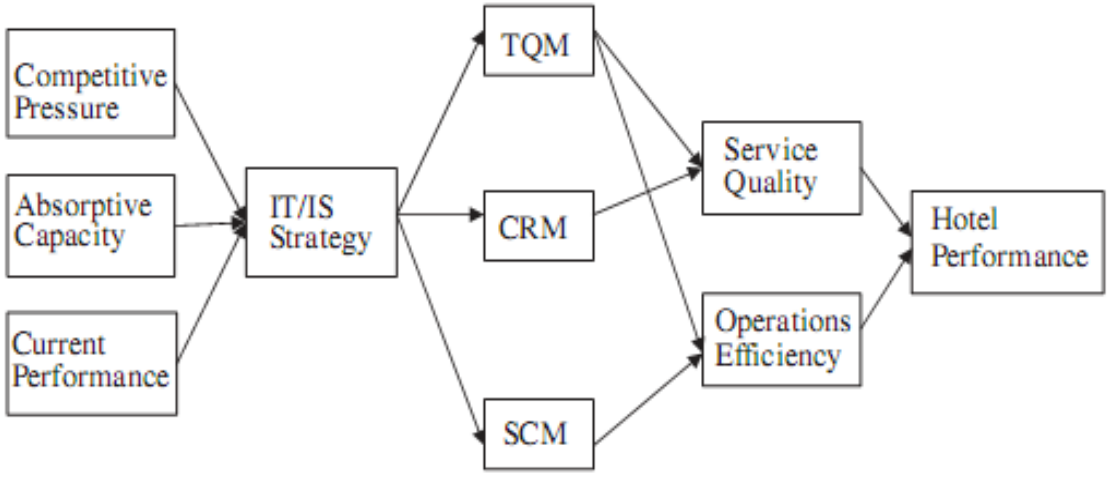

Fig. 2 Antecedents and Consequences of TQM, CRM and SCM Implementation. (Barkhi and Daghfous :2009)

2.5 Construction Supply Chains: Characteristics:

Construction supply chain involves stakeholders who are individual service providers such as subcontractors, designers, engineering consultants, transporters etc. and manufacturers of materials and equipments. On an average material cost contributes 50% to the project cost and hundreds of material and equipment suppliers take part in the supply chain. Apart from these suppliers, activities of the construction projects are subcontracted to specialty contractors such as designers, electrical, engineering, plumbing etc. Being a demand driven industry owner's involvement in the project remains crucial and continuous information flow from client is essential. Fig. 3, shows the highly non-linear characteristic of construction supply chains where strong supply chain information and material linkages are shown. Construction can be viewed as a complex of manufacturing and services. In this sense, many of the operations involved in manufacturing have similarity with construction projects in their characteristics. As an example, procuring materials and assembling them to make a product is common in both manufacturing and construction. This is the reason why Toyota, the leading Japanese auto manufacturer, has entered into housing construction and applying mass production and lean manufacturing techniques there.

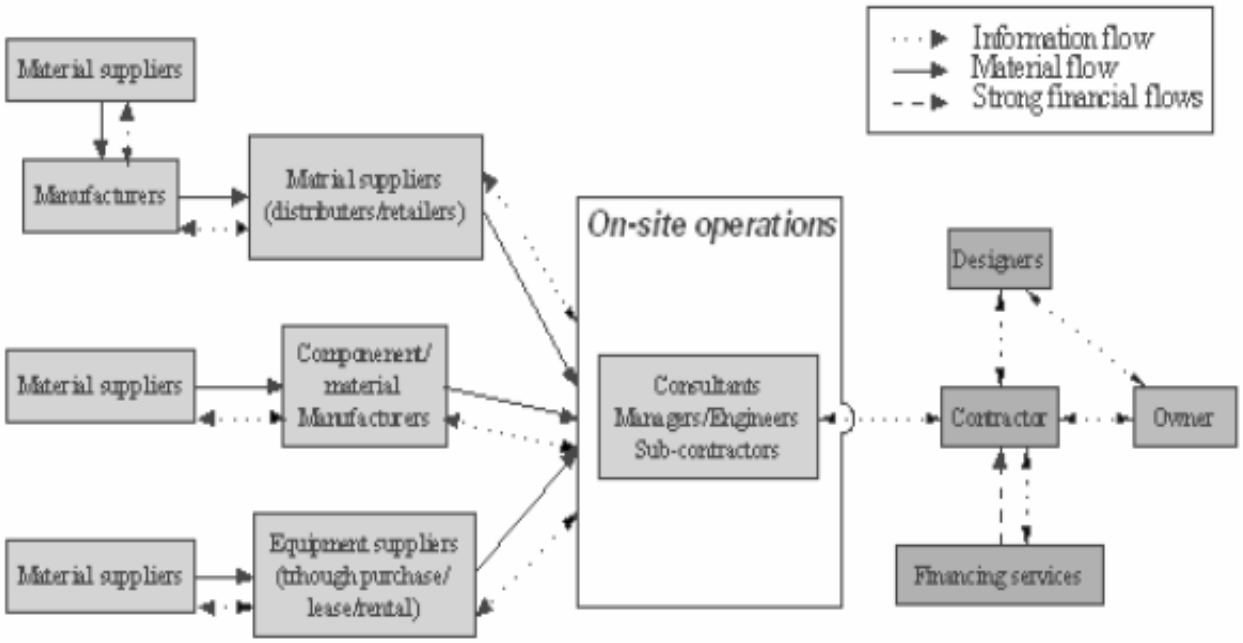

Fig. 3: Construction supply chain

III. CONCLUSION

Supply chain management (SCM) is a great opportunity for the construction industry primarily to reduce cost and time, and thus improve profitability. SCM principles seem to have much strength to smoothen and integrate the construction processes. The supply chains in construction could be divided into two major groups as materials chain and the construction chain, which would help to separate the procurement and management operations.

However, both chains are linked through a SCM database, which is further linked with the central project database. This would ensure the smooth flow of information within the different chains and results in increased collaboration within the supply chain partners. Obstacles for supply chain management are found to be poor level of logistical competence, lack of guidance for creating strategic alliances, inability to integrate the company's internal procedures, strong project focus as well as the attitudes and traditions in the construction industry.

Some serious flaws in the current project planning practices, which ignore information and resource constraints. Also the Risk Management should be more effective, in lack of which firms cannot avoid delays and cost over-runs. Forming Integrated Supply Chains is a strategy that construction industry should follow by forming long-term relationships with

suppliers; subcontractors and other supply chain players, sharing information for mutual benefits; and using IT to make it more efficient and effective.

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