

# INTEGRATING THE SUPPLY CHAIN WITHIN CONSTRUCTION INDUSTRY

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Since the middle of the 1990's, the researchers and people within the construction industry have moved towards Supply Chain Management (SCM) philosophy in order to make construction industry more effective and more efficient. The main driver behind the adoption of this philosophy was the successes within other industry sectors. SCM can be defined as network of different organisations, linked upstream and downstream in a chain, aiming to produce quality and value in the services and products for the end consumers through integrated processes and activities. In order to achieve the optimised level of integration of the whole supply chain, the industry has responded in various forms. One of the efforts is the change in procurement, from traditional to partnering arrangements. Research work has been done showing benefits of adopting the partnering arrangements, enjoyed by the whole supply chain. Despite the work done in this field (mentioned in this paper), there is still a need to look at: the different levels of integration within construction supply chain for example upstream by the client or client organisations and downstream by the sub-contractors and suppliers; the responses towards these partnering initiatives by the subcontractors and material suppliers; changes in the supply chain structures due to the implementation of SCM philosophy and partnering; analyses of rise in the competition among downstream supply chain (based on facts and evidences); level of collaboration and integration among supply chain participants; client-led supply chain vs. contractor-led supply chain; changes in public and private clients procurement system; the demand management within client organisation(s); government initiatives; supply chain networks and clusters; and integration of SMEs within these partnering arrangements. The paper will look at the research done within construction supply chain and will identify gaps for further research dealing with some of the issues mentioned above.

Key words – Supply Chain Integration, Construction Industry.

## INTRODUCTION

Construction is different from other industries because of at least following three reasons (Koskela, 2003): one-of-a-kind nature of projects, site production, and temporary organisation. In spite of above fact, many efforts have been done to translate good practices from other industries especially from manufacturing to the construction industry. For last few decades, the researchers and people within the construction industry have moved towards different philosophies adopted in other industries in order to make construction industry more effective and more efficient. Supply Chain Management (SCM) is one of them. The main driver behind the adoption of this philosophy was the successes within other industry sectors. SCM can be defined as network of different organisations, linked upstream and downstream in a

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chain, aiming to produce quality and value in the services and products for the end consumers through integrated processes and activities.

In order to achieve the optimised level of integration of the whole supply chain, the industry has responded in various forms. This paper will give an overview of what is being done in general and specifically within construction industry to support the integration of supply chain. Saad et al. (2002) argue that the construction industry has moved to the adoption of SCM philosophy, without having benefited from earlier philosophies in other industry sectors such as Just-in-time, Total Quality Management, and Concurrent Engineering. In other words, features from the above mentioned philosophies have become part of current practices of construction industry because of the adoption of SCM which lay the foundation of integrated construction supply chain. One of the features of the integrated construction supply chain is that they are centrally coordinated and the relationship between firms is maintained for the duration of a specific project and beyond. These chains are not only directed towards the minimisation of transaction costs, but also towards enhancement and transfer of expertise between all the parties (Vrijhoef and Voordijk, 2003). This paper will look into construction supply chain integration literature and will give a brief overview of the new project initiated by Scri Research Centre at University of Salford.

## **SUPPLY CHAIN INTEGRATION IN CONSTRUCTION**

The basic principle or keyword of SCM is ‘integration’ (Ofori, 2000). Through supply chain integration, the problems related to traditional approach in construction could be solved. These problems include (Ofori, 2000): win-lose arrangements; a focus on negative issues; uncertainty within construction process; a minimal exchange of information and knowledge; price competition due to buying of supplies of each item from many companies; and the environment of fear, dishonesty, and frustration.

Dainty et al. (2001a) referred to a term called ‘involvement climate’ to define integration of a supply chain. Nicolini et al. (2001) suggest the notion of ‘work cluster’ as an organisational approach to supply chain integration. Shimizu and Cardoso (2002) supported the view of integrated supply chain by putting forward the idea of cooperation network.

### **Why Integration?**

Hall (2001) presents the main findings of his research and admits that in order to bring the improvement within construction industry, the problems associated with creating better integration and communication through the supply chain should be addressed and solved. This requires move from contractors’ selection based on traditional lowest cost to best value; move from more oriented contractors’ relationship only with the client to everybody involved within the supply chain; and from dispersed project team at the end of each project to reparative supply chain on new projects. Many other researchers have carried out studies to find out the readiness of the industry for the adoption of integration philosophies (Khalfan et al., 2001; Khalfan et al., 2002). Briscoe et al. (2001) carried out interviews with a range of SMEs in order to determine if their current knowledge, skills, and attitudes are appropriate for achieving better supply chain integration.

### **Drivers and Barriers for Integration**

Tan (2001) has identified the key drivers towards fully integrated supply chain: change in the corporate cultures; trust and communication among all the parties involved, information/knowledge sharing, suppliers evaluation for supplier

development process, and sharing common goals of waste elimination and increased efficiency. In order to achieve higher levels of supply chain integration, Dainty et al. (2001b) observe the need to facilitate inter-firm relationships, achieve mutual benefits, and build trust at key interfaces in the supply chain (key interface: client/contractor, consultant/contractor, contractor/subcontractor, contractor/suppliers, etc.). It is crucial to take away the deep-rooted barriers of traditional relationships and the adversarial culture in construction practice, and instead, introduce a change management framework to facilitate the implementation of supply chain management at the operational level.

Figure 1 shows the direct link of high degree of supply chain effectiveness and efficiency to the high degree of the integration among the supply chain participants. This also concludes that in order to get more effective and efficient performance from construction personnel, integrate them into a team.

Key barriers to greater integration are due to fragmentation of project delivery system, lack of trust, and adversarial contractual relationship. Dainty et al. (2001b) suggest some of the solutions to the lack of integration within construction industry. One of them is that subcontractors and suppliers should be integrated formally into communication and reporting structures within the project organisational structure. This would also allow them to establish closer relationships. Barriers of integration could also be broken down through soft skills development, and especially the improvement of communication abilities among project based staff. Akintoye et al. (2000) also identified the key barriers to the integration which include: nature of construction project teams (each of them could be referred as 'temporary multiple organisation' which disappears after a project is completed), culture at the workplace, lack of commitment from senior managers, lack of trust, inappropriate support structure, and lack of knowledge about supply chain management philosophy in general.

Barratt (2004) talks about supply chain collaboration in detail in his recent publication. He reports some of the SCM implementation problems including: collaboration is difficult to implement; over-reliance on technology for implementation; failure to differentiate between whom to collaborate with; and lack of trust between trading partners. Barratt (2004) emphasises that the following questions (which are then followed by their answers in his paper) should be asked in order to understand issues related to SCM implementation: 'Why do we need to collaborate? Where and with whom can we collaborate in the supply chain? Over what activities can we collaborate? And finally, what are the elements of collaboration?'

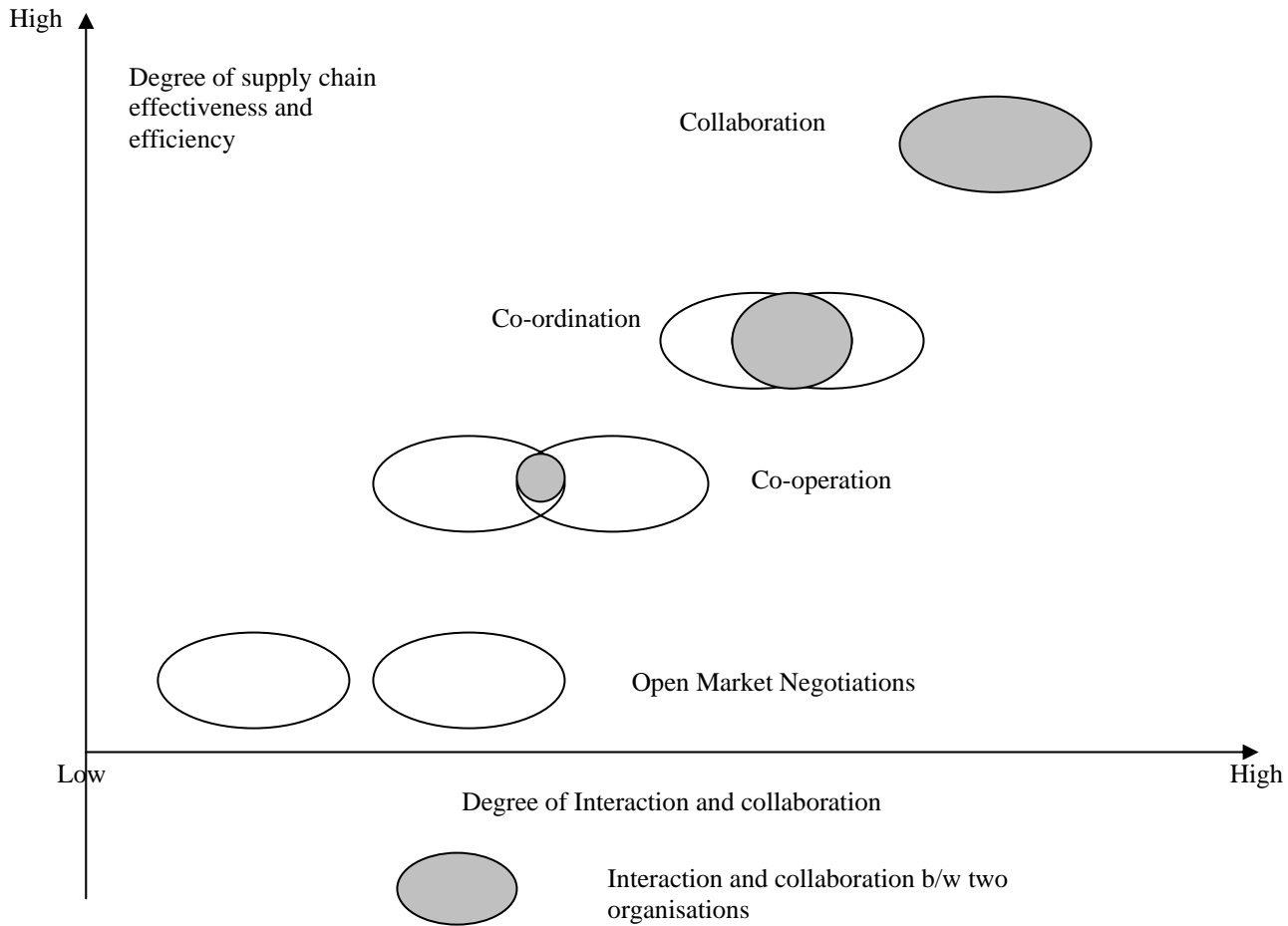


Figure 1: Move from traditional open market negotiation to collaboration

**Benefits of Integration**

Integrating supply chain, helps streamlining the objectives of all the trading partners to achieve the common goals of improving productivity and waste minimisation. This could also be termed as ‘inter-organisational cross functional integration’ (Maqsood and Akintoye, 2002). Such integration requires: integration of business processes of all supply chain participants; efforts and resources both in terms of cost and time; long term commitment; move from traditional contractual framework; and trust (Swan et al., 2001). Hall (2001) is also convinced that by integrating the supply chain resulting in sharing problems and working together to find solutions would not only benefit the client in delivery of a final project of greater integrity but also benefit themselves in improved margins, reduced stress and aggravation, development of no-blame culture, development of mutual understanding, and enhanced reputations.

**Required Culture for Integration**

Barratt (2004) proposes a ‘collaborative culture’ for integrated and collaborated supply chain within construction industry. The collaborative culture is made up of number of following elements: a collaborative culture; external and internal trust; mutual pain and gain; information exchange in the supply chain; transparency and quality of information flow; communication and understanding; effective cross-functional activities and process alignment; joint decision making; use of measures to

assess the performance of the whole supply chain; commit resources at the early stages of project development process; intra- and inter-organisational support; corporate focus on SCM; demonstration of a business case for collaboration; and a notion that collaboration does not need to be based on technology. Dainty et al. (2001a) have suggested changes which are required to make supply chain integration more effective. These changes include developing trust between parties; ensuring fair payments; early involvement with projects; educating the construction workforce; improving communication skills; knowing the operations of other type of organisations within construction supply chain; knowing the benefits of supply chain integration and partnering; understanding new contractual documents; client and MC organisations accepting that SCs can bring added values to the construction project delivery process; and willingness to share knowledge.

### **Achieving effective integration**

Proverbs and Holt (2000) advocate that supply chain downstream (including principle contractor, subcontractors, material suppliers, etc.) should be targeted as a mean of effectively reduced overall construction costs. They refer it as 'downstream strategic alliances' (DSAs). They also advocate early involvement of subcontractors and suppliers in the similar manner as of early contractor involvement. This would give an opportunity to downstream participants to offer their expertise which could result into potential cost savings. Such integration would help converting suppliers from providers of product to providers of services. This would also be the stepping stone of two way communication: i.e. 'downstream' from the client and 'up-feed' of materials and other specialist services from material suppliers and subcontractors.

## **INTRODUCTION TO THE SUPPLY CHAIN INTEGRATION PROJECT AT THE SALFORD CENTRE FOR RESEARCH AND INNOVATION (SCRI)**

This Section describes a research project, currently underway, that seeks, inter alia, to explore and explain the impact of the changing procurement systems, of both public and private sector clients, on the behaviours of firms in the construction supply chain.

The NAO (NAO report, 2001) has endorsed the public sector moves away from lowest cost and adversarial approaches towards the newer forms of procurement. In particular, it calls for the entire supply chain, including clients, to be integrated. Through *Achieving Excellence* (HM Treasury, 1999), the Government had already committed all government departments to:

- To work with industry to reduce waste in all aspects of construction procurement and management;
- To enter co-operative relationships with their suppliers to ensure an open and mutually productive environment, and
- To ensure an integrated supply chain.

*Building Down Barriers* (Holti et al., 2000) has investigated the Ministry of Defence *Prime Contracting* procurement policy. While concerned with project specific partnering, it suggested that there was some anecdotal evidence that the members of the successful project teams had kept together and moved on to other projects with other clients. Building Down Barriers (BDB) was unable to follow this through to examine the form of relationships and the exact benefits that were flowing. However, BDB suggested that the effective configuration of long-term supply chains might be

different for different kinds of construction. Further, this would suggest that appropriate models of supplier development, commercial relationships and agreements are needed for the different circumstances. This demands a contingency view of supply chain integration.

NHS Estates in response to Achieving Excellence has established *NHS ProCure 21* a strategy for Supply Chain Management and Integration that involves developing long-term relationships with those companies that will be their major suppliers of products and services.

The conflict between the process of market liberalisation and the development of effective and efficient industries is a common phenomenon. Many researchers have argued that procurement systems should be appropriate to the circumstances - not only to the client's circumstances but also to the circumstances of the industry. For example, Martins and Taylor (1996) in the context of the New South Africa, argued that they should encourage appropriate, people intensive technology and processes, and also open the way for learning and skill development. In these circumstances the procurement process assumes a greater status than it is normally afforded. This overseas example serves to emphasise the need in the U.K. context, not only "to consider current procurement and contractual relationships".... but also ...."to examine the structure of the industry" - which was actually the original brief referred to by Sir Michael Latham (Latham, 1993).

This project is timed to investigate the changes that are occurring in the supply of consultancy and contracting services in response to client procurement initiatives. It is particularly timely now with not only private sector clients, but public sector clients being driven towards partnering and the wider Egan Agenda. Through the Achieving Excellence initiative the Treasury/Government Construction Clients Panel, the Demonstration Projects of the Local Government Task Force (LGTF), and leading Central Government policies (such as the "Building Down Barriers"/Prime Contracting of the Ministry of Defence and NHS ProCure 21), government sector clients have required change the way they procure construction services. It is anticipated that specific advice and guidance for clients, practitioners and professional institutions will be developed through the adoption of the following methodology

### **Aims and objectives of the project**

The main aim of this research proposal is to determine if there are ways of integrating the supply chain that will ensure service and product quality whilst still supporting the government and client initiatives, aimed at increasing the competitiveness of the construction sector. Specifically this project has the following objectives against which the outcome of the work should be assessed:-

- Identify current international and national best practice in supply chain integration;
- Reveal the *critical success factors* for the establishment of effective and efficient supply chain integration – the behaviours/ responses to the new means of procurement made by successful firms in innovative supply chains. How successful firms are coping – through individual and corporate responses – (change programmes/change agents, training, alliancing, merging, new ventures etc. will be revealed);
- Test the proposition that the effective configuration of long-term supply chains will be different for different kinds of construction;

- Produce a contingency model of supply chain integration (which would lead to appropriate models of supplier development, commercial relationships and agreements for different circumstances); and
- Best practice guidelines for supply chain members to determine appropriate forms of relationships in response to the needs of different clients and produce best practice guidelines for clients and other members of the supply chain to determine appropriate forms of relationships in response to the needs of different clients.

### **Methodology**

Literature reviews and semi-structured interviews will be completed that explore the changes that are occurring throughout the supply chain. The immediacy of the need for information to feed the client, firm and institutional policy development only serves to emphasise this. Four case studies of construction projects (identified by the industrial participants as being exemplary) and two out of sector cases – probably from the motor industry (Unipart) and material supply (Marshalls), will be conducted. The contingency model, the critical success factors, and identified best practice guidelines will be further tested and validated before publication. Validation will be through a final workshop including the academic and industrial teams. A “foresight” style report “Supply Chain Competing with Supply Chain?” will be produced.

### **CONCLUSION AND FURTHER WORK**

Maqsood and Akintoye (2002) think that SCM has replaced partnering as a latest buzz word within the UK construction industry. They have also argued that SCM differs from the management of relationships currently practiced within the construction industry in two ways: firstly SCM considers management relationships as one of its components, and secondly SCM does not only focus on immediate trading partners but also takes into account all trading partners of the supply chain network. They talk about collaborative relationships between different construction organisations in detail. They concluded that the relationship management is one of the important components of SCM but not SCM in itself. Green et al. (2004) conclude that ‘within the context of integrated procurement approaches in construction, the conditions of mutual dependency will prevail across integrated supply chains. This will provide a significant break with the rump of construction industry. Clients may benefit through a more integrated services. Integrated supply chains potentially stand to benefit by competing primarily on the basis of innovation and expertise rather than cost. Construction firms are currently investing in new skills and the development of integrated supply chains for the purpose of competitive positioning. However, such trends are highly dependent upon a continuous flow of work of this nature’.

The paper presented a brief literature review on supply chain integration and some efforts within the construction industry. In the later part, the paper introduced the new project with its aim, objectives, and research methodology. The project is in its initial stages where initial literature review is done and the industrial partners are being selected. When this paper will publish, the research would have gone into its second phase, out in the industrial world interviewing different construction companies.

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