ISSUES IN ADAPTING SUPPLY-CHAIN MANAGEMENT (SCM) IN CONSTRUCTION INDUSTRY

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ABSTRACTS

Construction constitutes an important element in economic development. The economics of the industry primarily to reduce costs and time and thus improve revenues, therefore the component of inputs integration and flow of materials become major perquisite for the industry to remain competitive. Appropriately adoption of Supply-Chain Management (SCM) is a great opportunity for the industry to be more effective and efficient. However, obstacles for SCM in the industry are e.g. the poor level of logistical competence, the partly limited competition, the strong project focus as well as the attitudes and traditions in the construction industry. The industry can learn from the SCM principles and practices. To fulfill the theme of the conference, the discussion of this paper will look into the integration of the supply chain in order to boost efficiency and effectiveness across all supply chain in completing construction projects. Its conclude as SCM should be considered as essential method to the performance and competitiveness of the construction enterprise considering the variety of materials, products and components it requires on each project, the range of subcontracting companies it normally engages, and the variety of consultants it works with.

INTRODUCTION

The construction industry plays an important role in providing a range of the required infrastructure for socio and physical development while being a major contributor to overall economic growth. The industry needs to satisfy the changes as its responded to the rapid economic development. As outlined in Vision 2020, Malaysian economic is geared towards a developed and industrialized as the industry will tailored to the changes in construction demand. However, any attempt to formulate strategies for fulfilling future demand would require a reliable understanding of the past and present scenario of the industry. Since that the performance and the prospects for the economy have implications for the industry, construction industry development should be considered in the context of a country's economic development.

SUPPLY CHAIN MANAGEMENT IN CONSTRUCTION

Supply chain management is a great opportunity for the construction industry primarily to reduce costs and time, and thus improve revenues and still make the products more worth their prices. Also product development and marketing for construction material in the supply chains could be made more effective and efficient. Obstacles for supply chain management approaches are e.g. the poor level of logistical competence, the partly limited competition, the strong project focus as well as the attitudes and traditions in the construction industry.

The construction industry has been slower to employ the concept, which has been embraced elsewhere, perhaps because of the unique context in which SCM collaboration must be applied, i.e. an organisational structure consisting of individual elements in the nature of a conglomerate, termed `the temporary multiple organisation (Cherns and Bryant, 1983).

The construction industry can learn and gain from the SCM principles and practices. Bowersox et al. (1999) suggest that `leading logistical practice can be generalized across industries, across the supply chain, and across cultural boundaries. Mabert and Venkataramanan (1998) endorse this view, noting that SCM is relevant to small, single-location organizations as well as large multi-site ones. Lambert et al.

(1998) observe that the supply chain is not a chain of businesses with one-to-one business-tobusiness relationships but a network of multiple businesses and relationships. Thus, SCM deals with total business process excellence and is a new way of managing the business and its relationships with other members of the supply chain. The objective of SCM is to maximize competitiveness and profitability for the company and the supply chain network including the end customer.

According to Vollman et al. (1997) hold that construction SCM is increasingly seen as a set of practices aimed at managing and co-ordinating the entire chain from raw material suppliers to end customers. Bontekoe (1989) developed a list of 10 bottlenecks that hamper the application of logistics in construction which may also have application for SCM. These include a need for extensive preparation for approval procedures, conflicts of interest between organisations within the project organisation and a need for co-operation with public utilities.

The integration of the supply chain should aim to boost efficiency and effectiveness across all supply chain members. This aspect is most relevant to construction. SCM should be considered as essential to the performance and competitiveness of the construction enterprise considering the variety of materials, products and components it requires on each project, the range of subcontracting companies it normally engages, and the variety of consultants it works with. The traditional approach to business has several discernible elements: win and lose arrangements; a focus on negative issues; uncertainty; a minimal exchange of information; the buying of supplies of each item from many companies to maintain price `competition; and an atmosphere of fear, dishonesty and frustration.

These generally has negative elements characterize current business relationships among construction firms and their business partners. SCM is based on an alternative business relationship with the opposite of these features. Lalonde (1998) identifies the building blocks of a solid supply chain relationship as sharing of information; sharing of benefits and burdens; multiple contacts between economic entities; cross-functional management processes; and future-oriented collaborative processes. Such an approach would revolutionize the practices and operations of construction enterprises. A key word in SCM is `integration, a word which is rarely appropriate to the construction process, characterized as it is by fragmentation.

The generic concepts, methods and lessons learnt, which have been developed in the framework of SCM, can be used in different ways for the improvement of construction supply chains. In the following parts, we illustrate how the methodology of SCM can contribute to the understanding of construction supply chain problems, and in giving direction to improvement efforts. The bottom-line is the effective resolution of interdependency-caused issues in the construction supply chain, including basic problems and myopic control.

ISSUES IN ADOPTING SCM IN CONSTRUCTION

The case studies and existing research show that problems in construction supply chains are largely characterized by interdependency. Myopic control of the construction supply chain, combined with traditional trading and non-cooperative relationships, reinforces the problems, and complicates their resolution. Above, SCM has been introduced including an appropriate methodology to resolve the basic problems in the construction supply chain. The first step of the methodology suggests a chain assessment to uncover the nature and causality of the problems, which has been demonstrated earlier in the case studies.

Understanding existing problems is an absolute necessity to be able to resolve them effectively. The goal is to become totally aware of the real basics of the problems (i.e. seeing the “big picture”), and approaching the issue properly (i.e. holistically) in order to unlock possibilities for effective improvement

of the supply chain. In fact, it's a matter of making waste and problems visible and tangible, and identifying and detecting the root causes to make it possible to resolve them all.

The construction industry has been slower to employ the concept, which has been embraced elsewhere, perhaps because of the unique context in which SCM collaboration must be applied, i.e. an organisational structure consisting of individual elements in the nature of a conglomerate, termed `the temporary multiple organisation (Cherns and Bryant, 1983). Vollman et al. (1997) hold that construction SCM is increasingly seen as a set of practices aimed at managing and co-ordinating the entire chain from raw material suppliers to end customers. Bontekoe (1989) developed a list of 10 bottlenecks that hamper the application of logistics in construction which may also have application for SCM. These include a need for extensive preparation for approval procedures, conflicts of interest between organisations within the project organisation and a need for co-operation with public utilities.

The construction industry can learn and gain from the SCM principles and practices. Lambert et al. (1998) observe that the supply chain is not a chain of businesses with one-to-one business-to-business relationships but a network of multiple businesses and relationships. It deals with total business process excellence and is a new way of managing the business and its relationships with other members of the supply chain. The objective of SCM is to maximize competitiveness and profitability for the company and the supply chain network including the end customer.

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Lalonde (1998) identifies that the building blocks of a solid supply chain relationship: sharing of information; sharing of benefits and burdens; multiple contacts between economic entities; cross-functional management processes; and future-oriented collaborative processes. Such an approach would revolutionize the practices and operations of construction enterprises. A key word in SCM is `integration, a word which is rarely appropriate to the construction process, characterized as it is by fragmentation. Vickery et al. (1999) noted that SCM seeks to enhance competitive performance by closely integrating the internal functions within a company and electively linking them with the external operations of suppliers and channel members.

Based on the insight gained by means of supply chain assessment, the SCM needs to be fully applied to resolve the problems that were found in the construction supply chain. Because most problems spread across (a considerable part of) the supply chain, solutions are needed that equally cover multiple stages of the supply chain, including the actors involved. The range of the solutions and the part of the supply chain involved depend on the scale of the problems.

After having assessed the supply chain, the SCM methodology suggests redesign (reconfiguring the supply chain's structure), control (coordinating the supply chain according to the new configuration) and continuous improvement. For instance, towards suppliers, the methodology could include reengineering the procurement process, installing joint coordination of logistics and recurring product development programs. Typically, such activities include joint activities between separate actors in the supply chain.

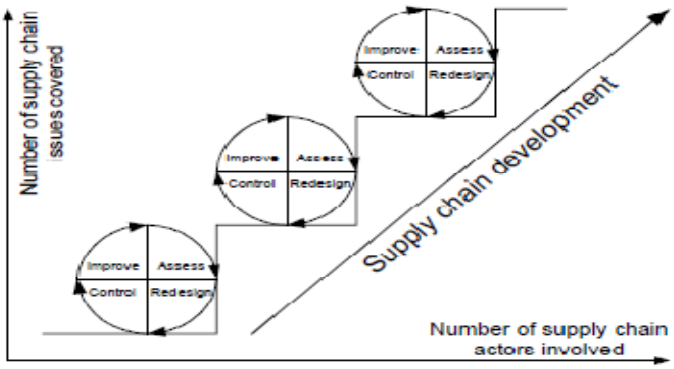

Figure 2: The general concept of Supply Chain Development

Supply chain arrangements counteracting adversarial relations with other actors (e.g.,partnership) are needed to enlarge the magnitude of the SCM methodology, and clear the way for resolution of interdependency-based problems and myopic control. In fact, actors are dependent on each other for implementing the supply chain methodology successfully. Supply chain development should take place in co-operation with a growing number of actors tackling a growing number of issues (Figure 1). The actors involved should have a common development goal, share the same view on the development, and adopt the same approach to issues such as grasping concrete and objective performance information, and searching for improvement opportunities cooperatively (Wegelius-Lehtonen and Pahkala 1998). It is interesting to compare the development issues of SCM, as defined by Lin and Shaw (1998), to the actual practice of construction (Table 1).

Table 1: Issues of Supply-Chain-Management (SCM)

Development issues	Description of the development	Actual construction practice
Order information transparency	The issue is how to manage the order information propagation to improve the supply chain.	It is not rare to find that the placing of a subcontract or material order is delayed due to price negotiations. As a result, the order information propagation is effectively halted.
Reduction of variability	The issue is how to reduce variability and how to make the supply chain robust when facing uncertainty.	Changes to orders, originating from the sphere of the client, the design team or the main contractor, are quite usual.
Synchronization of material flows	The issue is how to synchronize the availability of materials for assembly.	It is not uncommon to see that materials are produced in an order suitable for the supplying factory, and delivered to the site in a mode minimizing the transportation costs. Thus, other considerations than the needs of assembly dominate.
Management of critical resources	The issue is how to identify critical resources, lay out a critical path network and put the effort on reducing the workload of critical resources.	In the traditional design-bid-build procurement in construction, where the parties are selected based on price, it often is impossible or difficult to objectively identify critical resources of the supply chain in advance.
Configuration of the supply chain	The issue is how to evaluate and then change the chain.	This kind of continuous and long-term improvement of the supply chain is out of question, because for each project, a new supply chain is configured.

OVERSEA'S EXPERIENCES OF SCM APPLICATION IN CONSTRUCTION INDUSTRY

As far as adopting innovative procurement strategies and partnering concepts are concerned, the companies demonstrated great motivation to move from adversarial relationships to more collaborative ones (Khalfan *et al.,* 2001). The basis of all these innovative relationship models is the concept of partnering, resulting in the development of trust (Latham, 1993; McDermott *et al.* 2005), and long-term collaborative and integrated relationships among different organisations throughout the supply chain (Khalfan *et al.* 2001). Based on this principle, Cox and Townsend (1998) latter define this relationship as follows:

Construction industry has adopted the newer forms of procurement. In particular, it calls for the entire supply chain, including clients to be integrated managed using such method of procurement. Basically, advantages of SCM in construction industry can be summarized as follows;

- To work with industry to reduce waste (construction materials, labours or time) 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 from long-term relationship of suppliers to ensure 'just-in-time' supply of materials.

- Better be able to predict risks of disruption to production and design buffers to guard against those risks. Such buffers would include both schedule buffers and sequencing of production to mitigate the impact of problems should they occur. More broadly, they could use supply-chain knowledge to design schedules to meet project goals for speed, flexibility, and risk.

- Understand subcontractor and supplier production costs should there be changes in schedule and scope such as the delay to steel erection. Such knowledge would allow a directed search of alternatives to find optimal responses to these changes.

- Implement contracts that specify an equitable basis to pay for the true costs of changes, enhancing trust, and information sharing among firms.

The rapid increase of construction activities had imaged several negative consequences and constraints as result from inefficiency of the present procurement system. The increase of construction cost further accelerated by drastic change in various construction projects, inadequacy of materials and also increased of global inflation rate, less supply of construction materials and sharp-increased of prices of the main components of construction such as cement and steel. This had created a hard time for the industry to growth and this situation had consequently slow-down the implementation of many project scheduled to be completed during the year.

INTERGRATING SCM IN MALAYSIAN CONSTRUCTION INDUSTRY PRACTICES

Supply chain collaboration and management has been used in many industries to gain competitive advantage. From the retail industry to the automotive and the agricultural industries, the philosophy has examples of successful applications. Japanese car manufacturers have enjoyed the benefits of a close relationship with suppliers, enabling a close two-way flow of information and benefits. Following this success, The Supply Chain Council developed a supply chain operations reference model in order for different industries to apply the philosophy and improve their own strategy. The construction industry has been relatively slow to adopt SCM as a management strategy in part to be due to the well documented unique nature of the construction process and bespoke product with various stakeholders and a variety of objectives.

The contractors' opinions were surveyed because of their pivotal role in the construction supply chain, previously referred to. It was regarded as a timely exercise in view of the interest and energy devoted to the debate on new forms of procurement, which emphasizes the virtues of partnering, long-term and non-adversarial relationships as the key to substantial productivity gains for industry. The study reveals that contractors are more oriented towards clients rather than their suppliers in the supply chain. They have more arrangements with clients than with suppliers and a higher proportion of the relationships with clients are contractual. Owing to the aggressive business mentality of the industry and the non-trusting climate, contractors have tendencies to pay more attention to clients who provide their workload.

Supply chain collaboration and management is an important element of construction with nearly all of the respondents rating it as being important or critical for future success. Although improved quality assurance is not a key objective for SCM development, contractors do seek a better quality of service from suppliers. The problems in implementing successful supply chain collaboration and management within the UK construction industry are at present associated with an inappropriate traditional culture and the unique features of the organizational structure. Trust a major requirement for successful implementation is only now being actively cultivated by the industry. The lack of senior management commitment, the lack of appropriate support structures and the widespread ignorance of supply chain philosophy, must all be addressed if construction is to emulate other industries. Appropriate training and education, at all levels of the industry, is required to overcome these barriers.

CONCLUSION

There is scope for the application of SCM in Malaysia construction. Its focus on integration, the entire product life-cycle, and the inclusion of parties involved in all stages of the production process as well as stakeholders is particularly relevant. SCM covers a suitable approach to the effort to enhance the performance of the construction industry, as it will help to reduce the fragmentation and the win-lose short-term views which characterize relationships within the industry.

SCM can also help to effectively green the construction supply chain. However, several major obstacles will have to be overcome before SCM can be widely implemented in Singapore construction, including the conceptual problems of designing the appropriate supply chain, and practical ones of entrenched business practices and attitudes, and lack of knowledge about SCM or its benefits. Moreover, despite its potential, SCM will not be a panacea for all the problems of the industry. SCM should be implemented in the construction industry in its most comprehensive form (i.e., embracing all the parties involved in a project) if its full potential is to be realized.

In adopting the SCM in the industry, there are some considerations need to be addressed properly in system, it is important for the applied system to look into the following consideration, such as:

i. Select a procurement strategy that suits the nature of the project and the expertise of the client and their advisors

ii. Where practical use an integrated supply chain – or aim to establish it.

iii. Build long-term relationships based on trust and respect (true partnering)

iv. Keep the process 'alive' with continuous improvement strategies.

However at the governmental level, affords should be done to establish appropriate strategies to initiate the SCM to develop long-term relationships with those companies that will be their major suppliers of products and services.

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