

## **Extending Knowledge Management across the Supply Chains in the Construction Industry: Knowledge Sharing in Construction Supply Chains**

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### **Abstract**

Supply chain management and knowledge management have emerged as two distinct business philosophies in the last decade. Both are making rapid inroads into the construction industry. The premise of this paper is that knowledge management would make it possible for all the trading partners in a supply chain to reap benefits. Current research in knowledge management in the construction industry is generally targeting those big organisations that are main contractors. This has restricted the scope of knowledge management, and limits the benefits to a few, rather than the whole industry. If the construction industry as a whole is to prosper and improve its productivity, strategies for knowledge management strategy at the industry level must be established. This paper argues the case for extending the scope of knowledge management across the full extent of the supply chain, and attempts to identify the benefits that may arise out of sharing knowledge across the supply chain.

### **Keywords**

Supply Chain, Supply Chain Management, Knowledge, Knowledge Management

### **1. Introduction**

Supply chain management (SCM) and knowledge management are concepts that have emerged as distinct philosophies in the last decade with a tremendous potential to revolutionise the business world. Both are evolving and with further research and practice are expanding their boundaries. Each approach has their own research direction, but underlying similarities suggest that it might be possible to extend the complimenting parts and bring them together into an integrated model of SCM and knowledge management. This has the potential to help the construction industry to cope with tight economic conditions and highly competitive atmosphere. This short paper is a part of an on-going research study of knowledge management applications in the Australian construction Industry. It aims to unveil some of the hidden potentials of the knowledge management within the context of SCM in the construction industry.

## **2. Supply Chain and Supply Chain Management: A Brief Overview**

The concept of 'supply chain' is well established and it is generally recognised as the flow of information, physical distribution, and capital used to deliver products and services from raw materials to customers (Walker and Alber, 1999). The first supply chain model is attributed to Forrester (1961). SCM started to make its presence in mid 1980s after Houlihan (1984) introduced SCM theory in the field of logistics (Lamming, 1996). However, for over a decade and half, the SCM literature shows a confusion of terminologies and definitions (New, 1997). Some of these include; integrated purchasing strategy, supplier integration, supply base management, buyer-supplier partnership, supplier alliances, supply chain synchronisation, network supply chain, value added chain, logistic integration, lean chain approach, supply network, value stream, etc. (Dyer et al., 1998; Nassimbeni, 1998; Tan *et al.*, 1998; Ellinger, 2000). While each term addresses elements of a phenomenon, typically focussing on immediate suppliers of an organisation, SCM is the most widely used (but often abused) term describing this process (Tan, 2001).

Croom *et al.*, (2000) and Tan (2001) have provided an extensive review of supply chain related terminologies and suggest that SCM is an evolved form of purchasing and logistics-related activities. The notion of holism, grounded in the philosophy of SCM, is not achieved unless the evolved forms of purchasing/procurement and logistics/transportation are combined together (Maqsood *et al.*, 2002). This has contributed to the recognition that supply chain management is a 'management discipline' within a specific problem domain. It also addresses a concern of New (1997) who observed that the definitions in the SCM domain were either too strict and so closed the productive avenues of development, or were too loose allowing the label to collapse into an amorphous study of everything. Similarly, the Global Supply Chain Forum (GSCF), a group of non-competing firms and a team of academic researchers dedicated to improve the theory and practice of SCM, has developed the following definition:

Supply Chain Management is the integration of key business processes from end user through original suppliers that provides products, services, and information that add value for customers and other stakeholders (Lambert and Cooper, 2000, 66).

### **2.1 Importance of Collaborative Relationships in the Supply Chain Management**

SCM emphasises integration across organisations. The importance of business relationships is well established (Hallen *et al.*, 1991; Arndt, 1983), especially in the context of industry profitability (Shaw and Gibbs, 1995). Outsourcing decisions and strategies by an organisation result in the formation of networks that are supply chains. Each link in the chain, a trading partner, may have its own vision, objectives and profit generating tactics. However, there may be a mismatch with the objectives of other trading partners, leading to friction between partners, and the loss of valuable resources (Lambert and Cooper, 2000). SCM helps to integrate trading partners, to streamline their objectives, and to achieve common goals of improving productivity and waste minimisation. To achieve this, the business processes of the various trading partners also need to be integrated. However, this is not possible in a traditional setting where arms length adversarial relationships exist between partners. The integration of the business processes requires commitment from both organisations to set up a system to work together and gain the benefits. It is for this reason that SCM is said to have built on the foundation of trust and commitment (Lee and Billington, 1992).

## **3. Knowledge Management: A Brief Overview**

The present state of knowledge management is primarily concerned with the capture, codifying, transfer and sharing of knowledge that is embedded in organisational routines and processes. Such knowledge generally resides in employees' heads in a tacit form. The challenge of knowledge management is to make it explicit through the balanced use of technology, and soft human-related factors like leadership, vision, strategy, reward systems and culture.

Current knowledge management approaches are based upon initiatives from the late 1980s and early 1990s in the fields of knowledge engineering and artificial intelligence. These were dedicated to the development of expert systems and other knowledge-based systems for the capture, sharing and dissemination of knowledge. However, business communities did not readily adopt these initiatives, and the systems were judged ineffective due to the complexity and poor usability (O'Brien, 1997).

The introduction of the Internet, intranets, and ICT (information communication technologies), has provided organisations with new tools for the capture, coding, transfer and sharing of knowledge. Unfortunately, these initiatives also resulted in failure (Davenport and Porsak, 2000; Fernie *et al.*, 2002). Storey and Barnett (2000) conducted a study of the failure of knowledge management initiatives that confirmed the role of human factors. Observing these failures is the basis of understanding and learning that now recognises that knowledge management is 90% human activity and 10% technology (Egbu, 2000). Similarly, Tiwana (2003) reiterates that knowledge management is not about building smart intranets, digital networks, one time investment or enterprise wide 'Infobahn'. Within this emerging concept, the notion that knowledge is readily captured from humans and made part of machines is being questioned. Fernie *et al.* (2003) have argued against the assumption upon which orthodox knowledge management is based; that knowledge freely exists and can be easily captured and shared through machines. Rather, knowledge is a problematic concept that doesn't lend itself easily to codification.

This is especially the case for tacit knowledge capture, which is a major theme of contemporary knowledge management research. Tacit knowledge is highly individualistic and concomitant with the various surrounding contexts within which it is shaped and enacted. For this reason knowledge management professes the building of communities of practice (Wenger, 1998) and the development of social networks through which tacit knowledge transfers and sharing may be achieved. This shift in focus in knowledge management research has generated successful initiatives in the pharmaceutical, electronics and manufacturing industries. These organisations are changing into adaptive, learning organisations and are able to continually innovate, maintain and enjoy their competitive advantage.

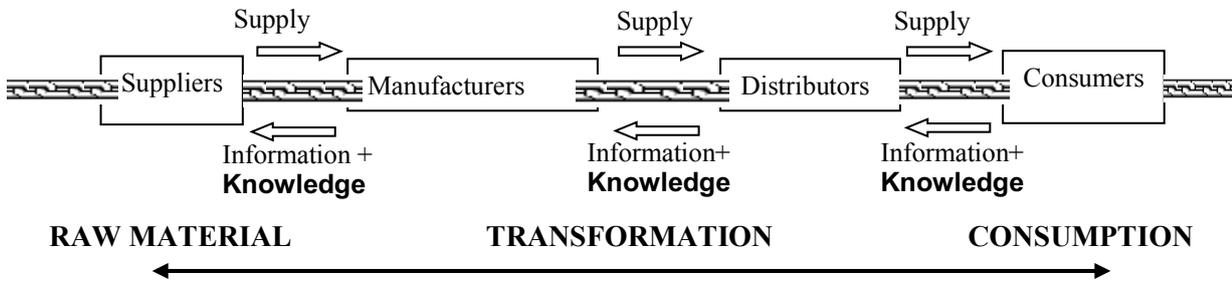
### **3.1 Perceived Benefits of Knowledge Management to a Specific Organisation**

The role of effective management of knowledge is evident in producing innovation, reducing project time, improving quality and customer satisfaction (Kamara *et al.*, 2002; Love *et al.*, 2003). Through knowledge management an organisation's intangible assets can be better exploited to create value, with both internal and external knowledge being leveraged to the benefit of the organisation. In projects, knowledge management can improve communications within teams, and provide more informed knowledge by sharing best practice documents, lessons learned, project management and system engineering methodologies, examples of review packages, and the rationale for strategic decisions. The failure to capture and transfer project knowledge leads to the increased risk of reinventing the wheel, wasted activity, and impaired project performance (Siemieniuch and Sinclair, 1999).

## **4. Knowledge Management in the Context of Supply Chain Management**

In the construction industry, organisations come together with their specialities and knowledge to complete a construction project. Each organisation contributes its knowledge in a form of people, processes and technologies, to the construction process. Traditionally, the selection of these organisations or trading partners is based upon a spot rate basis. This makes transactional exchange the dominant form of business in the construction industry (Dubois and Gadde, 2000). The suppliers' competition in each transaction is assumed to be the most appropriate means of securing efficiency of operations. Therefore, actor constellations change all the time, making it difficult to utilise the experience gained in previous projects (Dubois and Gadde, 2000). Cox and Thompson (1997) observe that this creates inefficiencies as the supplier climbs a new learning curve for each project. SCM deals with these problems by promoting relational contracting, long-term commitment and an atmosphere of high trust and commitment.

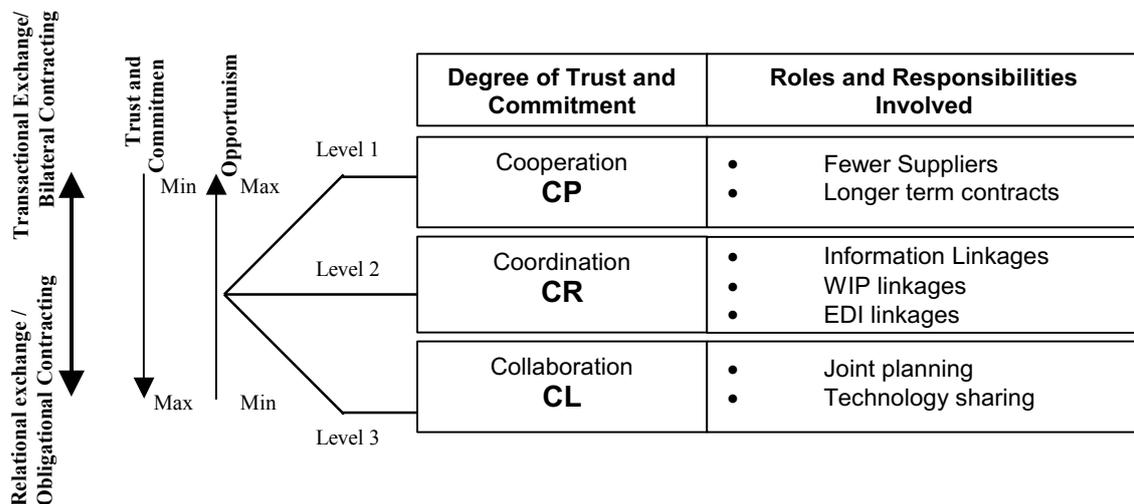
Through systematic knowledge management, trading partners are able to minimise wasteful activities and improve productivity and efficiency. Knowledge management, together with SCM, will ensure that knowledge, not information alone, is shared with the trading partners. Whereas the information may simply specify what is required of the trading partner, knowledge management can help to determine how best to deliver that product or ensure the swift availability of the related knowledge. A simplest supply chain model is modified as shown in Figure 1 to allow for the flow of knowledge, together with information, from one end of the supply chain to the other.



**Figure 1: A Simplest Supply Chain Model Modified to Allow Knowledge Exchange**

#### 4.1 Facilitating Knowledge Sharing in the Supply Chains

Collaborative relationships are important for the seamless working of the SCM principles. An atmosphere of high trust and commitment is also a prerequisite to employing knowledge management, especially knowledge sharing. SCM provides the essential ground for knowledge management to work by creating such collaborative relationships among trading partners. Spekman *et al.*, (1998) suggested four types of interactions between trading partners; open market negotiation, co-operation, coordination and collaboration. Co-operation (CP), coordination (CR) and collaboration (CL) are the important interactions that encompass different levels of trust and commitment and involve different roles and responsibilities an organisation has to carry out. This is illustrated in Figure 2.



**Figure 2: Various collaborative and knowledge sharing modes of Interactions among trading partners (Modified from: Spekman *et al.*, 1998)**

According to Spekman *et al.*, (1998) ‘cooperation’ is the threshold level of interaction where firms exchange essential information and engage some suppliers/customers in longer-term contracts. The next

level of intensity is 'coordination' where specified workflow and information are exchanged in a manner that supports seamless linkages between and among trading parties. The final stage is 'collaboration' where by partners engage in joint planning and processes beyond levels that reaches in less intense trading relationships. Collaboration requires high levels of trust, commitment, and information sharing based upon partners who share a common vision of the future. An organisation may work at any of these three levels of trust and commitment with other trading partner to facilitate the SCM, and may modify its selection after monitoring the interaction to observe change in the effecting factors. These various modes of interactions are in fact, limiting the magnitude of knowledge that can be shared with a specific trading partner. Knowledge management in this context would be helpful to provide detailed guidelines as to what sort of knowledge is appropriate to share in a certain mode of interaction.

## 5. Conclusions

This paper discusses the synergy that may be achieved when two philosophies, supply chain management (SCM) and knowledge management are enmeshed together based on their similarities. In an environment of SCM, an organisation may decide to work with its trading partners at any of the three levels of co-operation, co-ordination and collaboration. These levels differ in the magnitude of information and knowledge that is shared with the trading partners. Knowledge management can provide the mechanism and detailed guidelines to classify the required information and knowledge for these collaborative modes of interaction. Furthermore, it would make sure that knowledge management is implemented throughout the supply chain and not restricted to the big organisations that hold the vantage points in the supply chain. This will ensure that industry as a whole benefits from the joint application of knowledge management and SCM.

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