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SUPPLY CHAIN MANAGEMENT IN BUILDING AND CONSTRUCTION INDUSTRY: CASE OF AUSTRALIAN RESIDENTIAL SECTOR

Sonja Petrovic-Lazarevic, Margaret Matanda & Russell Worthy

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Abstract

In the recent literature the effective management of the supply chain has been identified as of significant importance to achieving and sustaining a competitive advantage for industrial companies. 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. Based on a recent research project conducted in the Australian BCI residential sector organisations, this paper highlights an understanding and application of SCM mainly from the project manager point of view. The paper indicates the importance of having good relationship with suppliers in terms of developed partnership, trust and bonding in order to remain competitive.

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INTRODUCTION

Building and Construction Industry (BCI) has characteristics that distinguish it from other industries. These are the physical nature of the product, the structure of the industry and the organization of the building and construction process (Petrovic-Lazarevic & Djordjevic, 2002). The product of BCI is mostly large and expensive and since it is located in a specific geographic area not generally transportable. Buildings and other structures are usually made to meet the requirements of each customer.

Three separate groups of people are involved in a construction process: client, designer and contractor. Client is an initiator of the building and construction process. Designer is a planer of principal activities. Contractor executes the building and construction job in residential sector, non-residential sector and engineering construction area (Australian Bureau of Statistics, 1993).

The work system in BCI is based on projects. Each project incorporates several organisations subcontractors that operate with their own objectives and pressures. In order to organise a building and construction process to function smoothly, the project manager has to control overall costs, time and quality of actions undertaken. Project management activity is temporary, but exposed to a constant pressure of time and cost constraints, competitive tendering and a practice of awarding contracts to the lowest bidder (Holmse, et al,1999).

BCI firms consist of large organisations with usually over 20 employees and small to medium enterprises with 5 to 20 employees (Lin and Mills, 2001). Large organisations have their project management sectors with appointed project manager for each project. Project manager is then in charge of organising the whole building and construction process including supply of material and equipment and upon completion of the object to follow a special legal procedure to deliver the object to the client (Petrovic-Lazarevic,1989).

Last two decades witnessed rapid growth in the concept of SCM being adopted by organisations in all types of industries and has been defined in a number of different ways. Cooper and Ellram (1993) described SCM as a philosophy to manage distribution channel from supplier to the ultimate user, while Christopher (1997) and Saunders (1994) viewed it as procurement and logistics. Kiefer and Novack (1998) define supply chain as an integrated collection of organizations that manage information, product, and cash flows in order to maximize consumption satisfaction with minimal total costs. SCM is also understood as a network of organizations in delivery channels that produce value for customers, and contributes to achieving and sustaining a competitive advantage (Cox, 1999a, 1999b, Towill et al, 2000). The Skjoett-Larsen's (1999) definition of SCM is based on development of teamworks with common vision and similar long-term objectives, and development of an information system that leads to trust and openness between parties.

There are also opinions that SCM should be defined differently in different industries. According to Titus and Bröchner (2005), SCM in the BCI deals with management of materials, but also with relationships between contractors, suppliers, and distributors.

Relationships between parties, or partnerships, are seen in the literature as a commitment between the client and supplier, cooperating to meet "separate but complementary objectives" (Blayse and Manley, 2004:). Folkerts and Koehorst (1997) argue that partnership approach results in greater accuracy, speed and flexibility in responding to consumer and environmental demands, development of new technology and products as well as more cooperation in maximising profits at chain level.

Partnerships can take many forms. According to Welling and Kamann (2001) supply chain partnerships in BCI can be at the firm level or the project level. At the firm level supply chain partners can have stable and long-term working arrangements among a limited number of firms. This is known as permanent networks (Dubois and Gadde, 2000). At the project level relationships are more temporary as they are usually established for the duration of the project - what Dubois and Gadde (2002) described as "*loose couplings".* Koskela and Vrijhoef (2001) argue that temporary partnership is an inhibitor to innovation. This opinion is supported by Dulaimi et al (2002), who in looking at the need for integration and innovation in construction, note that the Australian BCI was criticised for its low investment in research and having fragmented supply chains which affected its capacity to compete internationally.

Another type of partnership is identified by Love et al., (2002) who refer to alliances as being either strategic or project. In this instance project partnering is a relationship that is established for a single project which "focuses on short-term benefits", whereas strategic partnering is a long-term relationship across many projects which "seeks gains for the long term". From these definitions of alliances, the terms cooperative and collaborative have been linked by some authors to project and strategic alliances. Collaborative strategic alliances refer to parties working together for the short term and cooperative strategic alliances are for longer term partnerships (Hamel, 1989; Bronder and Pritzl, 1992; and Morrison and Mezentseff, 1997 cited in Love et al., 2002).

Although partnership plays an important role of SCM in BCI, according to Moberg and Speh (2003) development of trust and commitment is also significant.

Trust as the willingness to rely on an exchange partner in whom one has confidence (Moorman *e*t al., 1992) has many dimensions (Smith and Barclay, 1997). It indicates that partner can be trustworthy in one dimension but not in another. Wang et al (2004) suggest that traditionally, trust develops from specific events and repeated interaction, in relationship development. Thus, trust is strongly associated with commitment and loyalty. Another way of developing trust is a cue-based trust, or trust generated by an initial encounter with a stimulus, usually a symbol or sign, which is associated in the viewer's mind with trust.

Wood, et al (2002:4) explore the issues of the ethical benefits of trust-based partnering and state "that engaging in trust-based partnering encourages parties to adopt higher ethical standards, and achieve improved ethical performance in all their business dealings". It is intimated from this statement that trust could affect the efficiency and effectiveness of a firm's operations, depending on the partners they choose.

Lane and Bachmann, (1996) note that within a supply chain, inter-organisational trust is important in maintaining a competitive advantage. If trust is developed through contacts between parties, it then becomes a bond or a tie that brings partners together.

Bonding can take two forms: structural and social (Wilson, 1995). Structural bonds are those economic and strategic ties that link buyers and sellers, such as legal contracts and agreements. On the other hand, social bonds are made up of personal and social ties between individuals in organisations.

Wilson (1995) notes that structural bonds are important in any business relationship, but those organisations that have strong social bonds generally have a greater commitment in their relationships. Social bonds focus more on the interpersonal relationships between and in organisations; they may include creating a family type atmosphere and consideration for the other party when making decisions.

The paper aims to find out what does SCM mean in selected BCI organisations and what role partnership, trust and bonding play in improving the organisations competitive advantage. After this introduction an explanation of the methodology is presented, followed by the findings, discussion and conclusions with suggestions for future research.

METHODOLOGY

The qualitative research undertaken included in depths interviews conducted with eight selected companies in the Australian BCI residential area.

Table 1: BCI total value in 2005

Value of work done	AUD $m	%
Residential building	8728	38
Non residential building	4831	22
Engineering construction	9168	40
Total value	22797	100

Source: Australian Bureau of Statistics, 2006

Residential sector (See Table 1) makes 38 per cent of total value of the Australian BCI. The sector has remarkable annual increase of 9 per cent notified within last few years (Australian Bureau of Statistics, 2006).

Residential building area can be defined as the construction of new dwellings, but also the alterations, additions, renovations and general repairs to such buildings. In our research we have concentrated on the new buildings sector. Much of the activity in this sector is conducted by both private and public organisations, with the private sector playing the significantly larger role.

The research design was a semi-inductive approach aimed at learning from the field research rather than testing existing variables (Yin, 2003). An interview protocol with open-ended questions was developed setting out the statements upon which the discussions were based. The same questions were asked to all key informants in the same order as to facilitate cross–case analysis standardisation of the research protocol recommended by Miles and Huberman (1984).

Initial requests for interviews were made to the Managing Directors of each company requesting them to nominate managers that were more appropriate respondents for issues to be covered in the study. In depth face-to-face interviews were held by a researcher who had background in construction engineering. The interviews lasted one-and-half to two hours and were held at the respondents' offices.

According to De Vaus (1996), the choice of the sample for case study research needs to reflect the characteristics of the group from which it is drawn. Thus, eight case companies were selected to cover the various sub-categories of the residential BCI in the Greater Melbourne area.

Table 2 provides details of the companies involved in the interviews. For a variety of reasons, the company names are not identified and are simply referred to here as Company A to Company F. All interviews were tape-recorded and transcribed. Exceptions were only few when sensitive issues were being discussed and the interviewee requested that the tape recorder be switched off.

The companies were classified as:

- low-income housing construction ($100,000 to $300,000)
- middle to high income construction ($300,000 and above)
- specially or architecturally designed homes (also included green houses)
- units, apartments or cluster houses.

Table 2: Companies Involved in the Research

Company	Company Description	Interviewee's Position
A	• Small size • Middle to high income	Director/builder
B	• Medium size • Low income	Administration Manager
C	• Large franchise • Low income	Operations Manager
D	• Leading construction and development firm • Specially or architecturally designed homes	Building Manager of one firm within the group
E	• Corporate property development group • Specially or architecturally designed homes	Cost Planning Manager
F	• Corporate developer and builder • Middle to high income	Supply Manager
G	• Multi-national project management and construction firm • Units, apartments or cluster houses	Senior Site Manager
H	• International Construction firm • Units, apartments or cluster houses	Senior Site Coordinator

The questionnaire consisted of the following parts:

- What does SCM mean for selected company?
- What is the role of partnership and trust in the SCM?
- What is the role of bonding in the SCM?

RESEARCH FINDINGS

The research findings are presented by the questionnaire parts.

Meaning of SCM

All approached companies base their work on project management. Accordingly, supply chain partnership is at the project level facing only networks between the company and its suppliers. As such, the understanding of SCM is primarily and only related to a supply side. All interviewees indicated that supply chain is a system to manage goods and services in order to ensure that projects were completed on time and within budget.

Operating the supply chain differ across the companies. Very small companies tend to have multi-task staff members. For example, in Company A the builder handles all supply chain negotiations including the building of the houses. Slightly larger firm, such as Company B, has staff members who have procuring supplies as one of several back-room responsibilities. Generally, orders are placed on an ad-hoc basis personally or over the telephone. In contrast, larger organisations (Companies C-H) have standardised processes with an established list of suppliers, through formal contracts.

Irrespective of size, all organisations agree that supply chain arrangements are important to offer an attractive price to the client and high quality of service and products.

Partnerships and Trust

While all companies regarded relationships as important, small firms tended to have a more "personal" relationship with their suppliers. Director of Company A said, "It is always good to ring a familiar face". The importance of the personal touch was found when Company A urgently needed particular glue; the supplier was able to drop it off at the builder's home, thus allowing a job to be completed. Larger firms operated on more formal arrangements, a more "business-like approach". For example, building manager from Company D noted: "We are in business and other things matter only when the first objective is fulfilled. Simply because we like a supplier, does not mean that we will continue that supply chain if the supplier keeps failing our demands." The interviewee from the Company D also highlighted that they expect loyalty from both sides, as long as the supplier does the right thing.

The messages, however, were mixed on the degree of trust shown by firms towards suppliers. Nearly all interviewees claimed to trust their suppliers. Cost Planning Manager from Company E said: "We have confidence in our suppliers. They have helped out in contracts" (as did suppliers for Company F). Senior Site Manager from Company H generally felt that he had confidence in his suppliers and even shared designs and plans with them. Senior Site Manager from Company G pointed the company's loyalty to their suppliers when they had to go to another supplier for plasterboard because their regular supplier had production problems. However, Company G returned to the original supplier once the problem was fixed. Nearly half of the firms, spread across small and large categories, specifically referred to their respect for their suppliers. Cost Planning Manager from Company E summed up: "The supplier is not as close as family. The supplier is more of a good working relationship." In Company B, however, they always compare prices when given quotes by their regular supplier. "One has to constantly review the suppliers as it is too dangerous to be with one supplier". Interviewee from Company H claimed that their suppliers have good intentions: "but we can't be sure of the trustworthiness."

Bonding

Both forms of bonding, structural and social, as identified by Wilson, (1995), were found in this study to varying degrees, across all companies. The structural bonds, such as legal contracts and agreements, tended to be found in larger firms, although the actual structure varied. Company C's group selected preferred suppliers and each franchise bought from them, although they could choose their own. Company D had a similar system however; all group companies used the same suppliers, (as did Company F). Variations to the preferred list approach were noted in two firms: Company E had a formal contract to cover all sites; although it also had several long-term informal arrangements. Company G negotiated national supply agreements, with preferred suppliers, including formal alliance agreements for some products with major suppliers. On the other hand, Company H had only a limited number of national agreements because they used sub-contractors who had their own suppliers. The situation in the smaller firms varied, ranging from Company A which knew the suppliers personally for five to ten years to Company B who knew the suppliers but always checked the prices each time.

There were two aspects of social bonding activity identified – supplier initiated and firm initiated activities. All firms noted that such activities occur to some extent. Supplier activities varied, ranging from low-key social gathering to going to Christmas lunch and suppliers tents at the races (Company B). All the construction firms realised that being entertained by suppliers had a business outcome.

In terms of company's initiated activity it was noted that 70 percent of firms, large and small, claimed to maintain a healthy relationship with suppliers, especially those suppliers who could affect their bottom line, through limited reciprocity. As Company C's interviewee noted: "We regarded…our suppliers as team members – they are vital and we make them feel important. However, we are in business." At a social level half the firms had some organised activity. For example, Company A had a barbecue for sub-contractors; a golf day for key suppliers was run by

Company C and Company G. Yet Company H went so far as to suggest socialising with suppliers could appear to be unethical in terms of later contract decisions and thus did not encourage nor require it.

DISCUSSION

For all companies we have approached the SCM is understood as a partnership relation to suppliers. That obviously indicate an understanding of SCM close to Titus and Bröchner (2005), but still different as it does not include relationship wit distributors. Therefore, SCM in BCI seems to be one sided. Although one would expect an understanding of SCM in BCI more related to Skjoett-Larsen's (1999) definition with importance of team work leading to trust between parties – there was no such evidence in this research.

Because of the nature of the work in BCI based on tripartite relation: client, contactor and designer, of which we have researched the contractor part – it is clear that the only contractor supplier side was relevant for understanding the importance of SCM to improve organisational competitiveness. None of the approached companies had supply chain partnership at the firm level. In stead, in all eight cases supply chain partnership was based on the project level. According to Welling and Kamann (2001), relationships with partners are temporary, established for duration of the project. Our findings, however, indicate that in some cases (Company H and Company G) partnership was not temporary.

It was found, overall, that the processes in supply arrangements are similar across the BCI residential sector. Such arrangements cover Love, et al.'s (2002) definitions of both alliances (short term gain focus) and strategic partnering (longer term gain). However, the relationships between the suppliers and the BCI firms underpinning these arrangements appear to range from a "personal" approach in the case of smaller firms to a more "contractual" or "business-like" approach with larger organisations. This latter situation is closer to a more conventional supply chain process, with a focus on what the literature refers to as collaborative strategic alliances.

It seems that because temporary partnership prevails in the approached companies of our research project, it may become an inhibitor to innovation in BCI, as noted by Koskela and Vrijhoef (2001). Further, according to Dulaimi et al (2002) it may increase research in the industry and through supply chain influence the industry competitiveness. In an unexpected result it was found that all firms indicated they relied, to varying degrees, on suppliers to provide advice on research and innovation. This support, both reactive and proactive, was found to be especially evident with larger firms, covering all aspects of the supply chain.

The factors of trust and bonding in particular emerged as key areas of relationship development, consistent with the findings of Wang et al (2002). Again, consistent with the findings of these authors, it was noted that companies specifically mentioned respect for their suppliers as important. This respect appears to have been developed through experience rather than any cues – this statement does not mean cue-based trust did not exist, just that there was no evidence of it in the responses during the interviews. Yet a theme of tempering trust was found in several examples spread across all sized firms; larger firms talk about working together and helping each other - bonding and trust - but they also have these expectations written into contracts. Such behaviour raises the issue identified by Moberg and Speh (2003) and Wood et al (2002) - to what degree do these firms actually trust each other and how will that affect relationships and the effective management of the supply chain? It also highlights a degree of vulnerability felt by firms, consistent with Moorman et al (1992).

Structural and social bondings, as identified by Wilson (1995), were found across all companies to some extent. Structural bonding was particularly prevalent in larger firms, possibly due to the need for more formal arrangements related to accountability issues. Wilson (1995) suggests that social bonds consist of personal and social activity, that organisations with such bonds generally had a

higher commitment in their relationships. However, our research showed that this was not necessarily the case in the BCI. While social bonding appeared to be accepted as a practice it was not encouraged by all firms, particularly the larger firms - with at least one firm actively discouraging such bonding.

CONCLUSIONS

The research project conducted in the Australian BCI companies in residential sector has demonstrated that SCM is of importance to achieving and sustaining competitive advantage. SCM is understood as a temporary partnership with suppliers based on the project level. Since temporary partnership, as suggested by Dulaimi et al (2002), has potentials to increase interests in research development in the BCI organisations, it may lead to innovations that should improve the BCI competitiveness.

Relationships with suppliers were found to be more “personal” in the case of smaller firms, while with larger organisations they had more “business-like” approach. From the point of view of trust and bonding, a respect to suppliers developed through experience was indicated as important. Structural bonding was characteristics of larger firms, while social bonding was applied in smaller and medium firms.

This research was limited to a small selection of firms providing several opportunities for further research. A more extensive survey needs to be conducted to verify initial findings in other remaining sectors of BCI; that is in non residential building and engineering construction sectors. The possible link between trust, bonding and innovation is also worth exploring given the need for BCI firms to be constantly innovating for competitive advantage.

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