

KNOWLEDGE MANAGEMENT IN CONSTRUCTION ORGANISATIONS IN AUSTRALIA USING SOCIAL NETWORK ANALYSIS: A RESEARCH FRAMEWORK

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Abstract

The project-based settings in construction hinder the transfer of knowledge from one project to a future project. Hence, new knowledge created within construction projects should need to pass to the organisation level and then be shared at the organisation level and transferred to other projects. Previous research had found that construction project knowledge is more likely to be disseminated through networks of strong personal relationships. Hence, it is important to build and maintain strong networks within construction organisations to enable wider dissemination of project knowledge. However, little is known on how such networks exist in construction organisations in Australia. Social network analysis provides a method of analysing network patterns. Using social network analysis as a tool for the study of construction management issues has grown considerably in the past decades. However, there have been limited attempts to incorporate social network analysis into the study of knowledge management networks in the construction industry. By using social network analysis, this research aims to identify and measure the key social networks that disseminate project knowledge within construction organisations, through several case studies. In this paper, the literature findings are presented with the proposed research methods. The literature review findings revealed that the organisational structural capital nurtured through network ties and their configuration would effectively enable the project knowledge dissemination process within construction organisations and these could be effectively identified using social network analysis. The literature findings finally led to the development of a research framework. Future research will use this method on an empirical phase.

Keywords. *Knowledge Management, Knowledge networks, Social network analysis, Construction organisations*

1. Introduction

The success of a construction business in today's competitive market place depends critically on the quality of the knowledge it possesses regarding its markets, products, and technologies (Faraj, 1999). Pathirage et al. (2007, p.116) stated, "as a consequence of knowledge becoming a valuable organisational resource within the business community, there is an increased concern in organisations' efforts to deliberately manage knowledge in a systematic manner."

Knowledge gained on a particular project and disseminating lessons learned from problem projects may be used to avoid similar mistakes being repeated (Carrillo, 2004), and prevent 'reinvention of the wheel', and facilitate innovation, increased agility, better teamwork and improved project performance (Kamara et al., 2003). As discussed by Disterer (2002), the transfer of knowledge from projects to the routine organisation is explicitly assigned in project documentation. Further, Disterer (2002) stated that most of the project knowledge is hidden in heads of some project team members, which need to be disseminated within routine organisation before project team disbands.

Knowledge dissemination as a sub process of knowledge management consists of knowledge transfer and knowledge sharing (Hari et al., 2005). It relates to how knowledge is passed between individuals in the environment within which they work (Almond, 2001). Carrillo (2000) showed that failure to capture and transfer knowledge generated within one-project leads to wasted activity and impaired project performance. Hence, existing literature continues that disseminating and application of project knowledge within organisations is a critical area that needs more emphasis.

Some authors (Lang, 2004; Athanassiou and Maznevski, 2002) identified that, complex tacit knowledge is likely to be transferred through social networks and processes. As Lang (2004) contended, much of knowledge is tacit residing in social interactions in team relationships within organisations. The literature suggests that socialisation processes are much related to social capital of organisations. In fact, Bresnen et al. (2003) identified that, process of knowledge transfer and learning in project settings rely very heavily on social patterns, practices and processes within construction organisations.

Nahapiet and Ghoshal (1998, p.243) defined social capital as "the sum of actual and potential resources embedded within, available through, and derived from the network of relationships possessed by an individual or social unit. Social capital thus comprises both the network and the assets that

may be mobilised through that network.” Nahapiet and Ghoshal (1998) argue that social capital consists of three distinct but closely interrelated dimensions that they describe as structural, cognitive and relational. Structural dimension explains the overall pattern of connections between the actors within a network. Cognitive dimension emphasises the learning process among the individuals. Relational dimension can be described as personal relationships that individuals have developed with each other through a history of interactions.

Recent attention has been directed at structural dimension of social capital. This paper reports mainly on structural dimension of social capital, which focuses on ‘social networks,’ as an enabler for disseminating construction project knowledge. Next section presents the key literature findings of this study.

2. Literature Findings

2.1. STRUCTURAL DIMENSION OF SOCIAL CAPITAL

The structural dimension of social capital concerns the properties of the social system and it refers to the impersonal configuration of linkages between people or units focusing the overall pattern of connections between actors (who can be reached and how you reach them). The structural dimension influences the sharing of knowledge through ways, which directly affect the condition of accessibility to information and knowledge (Nahapiet and Ghoshal, 1998). Chua (2002 p.376) states, “when organisation members are connected socially through physical means (such as being involved in brain-storming sessions, meetings and task forces) or through electronic means (such as engaging in e-mail and on-line discussions), the opportunity to access information and knowledge among themselves is enhanced.” Nahapiet and Ghoshal (1998) described that among the significant features of structural dimension are the presence and absence of network ties between actors, and their network configurations. These key drivers of structural dimension are discussed hereafter.

2.2. NETWORK TIES

Network ties take into account the presence or absence of social ties with other organisation members within the organisation (Nahapiet and Ghoshal, 1998). Chua (2002) emphasised that network ties provide access to knowledge resources. It can be explained as ‘who you know’ affects ‘what you know’. Coleman (1988) explained that social relations, developed for other purposes, constitute information channels that reduce the amount of time and investment required to acquire information. This is also evident by

explanation of Hoffman et al. (2005) who state that information channels (social networks) within the organisation are the most obvious example of social capital. They are the directly observable inventory of social capital. Information channels not only contain the formal structure of an organisation but also it consists of personal relationships that people develop with each other. Marouf (2007) notes that formal relationships are documented with job descriptions and organisational charts. Every organisation also has its informal networks – people who know each other and help each other regardless of rank, function, job title and so on.

Further, Marouf (2007) identified two types of ties in a working environment as business ties (based on common business tasks) and social ties (based on emotional relations). Marouf (2007) revealed that prescribed networks and emergent networks are developed through business ties and social ties respectively. Prescribed networks are those that are composed of a set of formally specified relationships between superiors and subordinates who must interact to accomplish an organisationally defined task. Emergent networks, on the other hand, involve informal, discretionary patterns of interaction where the content of the relationship may be work related, social, or a combination of both.

Nahapiet and Ghoshal (1998) described a third feature of structural capital as appropriable organisation, which is grouped here under network ties. According to Coleman (1988), the appropriable organisation is the existence of networks created for one purpose that may be used for another purpose (e.g. development of personal relationships into business exchanges). Social capital developed in one context, such as ties, norms and trust, can often (but not always) be transferred from one social setting to another, thus influencing patterns of social exchange. Nahapiet and Ghoshal (1998 p.253) expressed that: “appropriable social organisation can provide a potential network of access to people and their resources, including information and knowledge and through its relational and cognitive dimensions, may ensure motivation and capability for exchange and combination.”

2.3. NETWORK CONFIGURATION

Nahapiet and Ghoshal (1998) discuss that the network configuration properties such as density, connectivity and hierarchy are features associated with flexibility and ease of knowledge exchange through their impact on the level of contact or accessibility they provide to organisation members.

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Structural holes (areas of the network not well connected) within organisations hinder information flow and promote competition. One of the benefits of high levels of social capital is the limiting of structural holes within the organisational network (Hoffman et al. 2005). Moran (2005) explained that the contemporary social capital literature is too easily associated with network structure, and even a particular form of network structure (structural holes). The major benefits that a well-developed information channel provides are plentiful and strong ties within the network. These ties, in turn, provide closure (Coleman, 1988). Closure can be described as the existence of sufficient ties within a social network to guarantee the observance of social norms.

Moreover the 'embeddedness' (concept that behaviors and institutions are constrained by ongoing social relations) of interpersonal ties within organisation members may be viewed as a continuum ranging from one extreme of high social embeddedness to the other extreme of low embeddedness or arm's length in nature (Lang, 2004). The strength of an interpersonal connection was found to lead how easily knowledge is shared (Hansen, 1999; Uzzi, 1997; Carolan and Natriello, 2006). Recent studies have used frequency of interaction and closeness of ties to measure the tie strength. Frequency of interactions is defined as how often people contact each other for various reasons. Closeness of a relationship is defined as the emotional intensity between two actors Marouf (2007).

Granovetter (1973), a pioneering researcher of social networks, provide a different argument that weak ties are efficient for knowledge sharing because they provide access to novel information and people. Subsequent research has generally supported Granovetter's (1973) theory, but switched the emphasis to the effective character of strong ties. Consequently, the empirical findings of Hansen (1999) shows that weak ties help the project teams to search for useful knowledge but impede the transfer of complex knowledge, which tend to require a strong tie between the parties to a knowledge transfer.

2.4. STRUCTURAL CAPITAL AS AN ENABLER OF CONSTRUCTION PROJECT KNOWLEDGE DISSEMINATION

According to Nahapiet and Ghoshal (1998), the embedded and available knowledge resources within cohesive social networks which can be derived from the structural dimension of social capital through network ties, network configuration and appropriable organisation, described as 'organisational structural capital'. Structural capital is owned jointly by the parties to a relationship. Social relationships generally, though not always, are

strengthened through interaction but die out if not maintained. Thus, social interaction, socialization processes and social practices are crucial for development and maintenance of dense structural capital (Nahapiet and Ghoshal, 1998). Crucially through high levels of structural dimension of social capital, organisations can gain direct access to economic and other resources privately possessed in the network (Portes, 1998), which leads to better knowledge management within an knowledge intensive organisation (Willem and Scarbrough, 2006).

Literature elaborate that there are four conditions for resources exchange (knowledge sharing/knowledge dissemination) to take place. They are accessibility, anticipation of value, motivation (because of personal benefits) and capability to exchange (Nahapiet and Ghoshal, 1998; Whittaker et al. 2003; Manu and Walker, 2006). Whittaker et al. (2003) revealed that structural capital has a direct impact on these criteria to enable knowledge dissemination process.

There is also very little work that has attempted to explore the effects of structural capital in circumstances such as construction, where work is project-based. In one of the few studies, Bresnen et al. (2005) emphasis that with respect to the structural dimension of social capital, the individuals used each other as a first point of contact for knowing who to contact to access specialist experience and expertise. Expressed differently, Styhre (2008) states that network of relationships are key to the maintenance and development of know-how in the construction industry. According to Bresnen et al. (2005), the cohesive network of individuals through nurturing social capital, provided an important conduit for engineering knowledge dissemination throughout the firm. In other words, these networks of relationships will provide accessibility to individuals to disseminate project knowledge (Manu and Walker, 2006). Moreover, preferred means of contact were by very traditional means, i.e. by direct contact, telephone and e-mail.

Contrary to other industries, construction organisations are paying comparatively little attention to the formalisation of knowledge. Instead, word of mouth and personal contacts play a key role in the 'knowledge system' (Styhre, 2008) that dominates within most of the construction organisations). Styhre (2008) notes that, rather than assuming that this is an archaic or outmoded form of knowledge sharing, this embedding of expert know-how in social capital and oral communication is the most effective way to store and disseminate valuable project knowledge within a construction organisation.

Manu and Walker (2006) investigated how lessons learned from a construction project relate to the interaction between social capital and knowledge transfer. They found that the four conditions (access to a social network, anticipation of the value, motivation and capability to exchange) are highly demanding for many traditional construction organisations for disseminating knowledge and these are considered as the influencing factors for the presence of network ties.

2.5 SOCIAL NETWORK ANALYSIS

As discussed in the literature, construction management researchers had found the importance of social networks in wider disseminating project knowledge. Identification of such networks is important in order to enable knowledge dissemination process. In this regard, social network analysis is seen as a useful tool that helps to identify patterns of networks and analyse how strong they are based on their network configurations.

Social network analysis (SNA) is a recently growing method that provides a method of analysing network patterns. Using SNA as a tool for the study of construction management issues has grown considerably in the past decades (for example, see, Ruan et al., 2013, Pryke, 2012, Park et al., 2011, Pryke, 2004, Haythornthwaite, 1996, Chinowsky et al., 2008, Chinowsky et al., 2010). However, there have been limited attempts to incorporate SNA into the study of KM networks in the construction industry.

The analyses of network features using SNA vary greatly from what a traditional individualistic, variable-based approach can achieve. This is because traditional method of analysis calculations takes into account only the individual characteristics of the subjects and ignores the broader context of interactions with the social networks connecting them to other subjects. Hence, SNA is found as a powerful tool that enables to identify and measure network configurations of organisational structural capital. This way it would be possible to find out how the influencing factors lead to different network patterns.

3. Research Framework

Figure 1 brings together the above literature discussion into a research framework. The heavy reliance on social networks found in construction settings demand that knowledge management approaches in the construction industry should focus on the structural capital of construction organisation. In that, strong network ties with their configurations could be identified

using SNA and the factors that affect (for example, the four conditions discussed above) these networks could be determined so that structural capital could be used as an enabler for knowledge management in construction. Next section sets forth the research method adopted in this study.

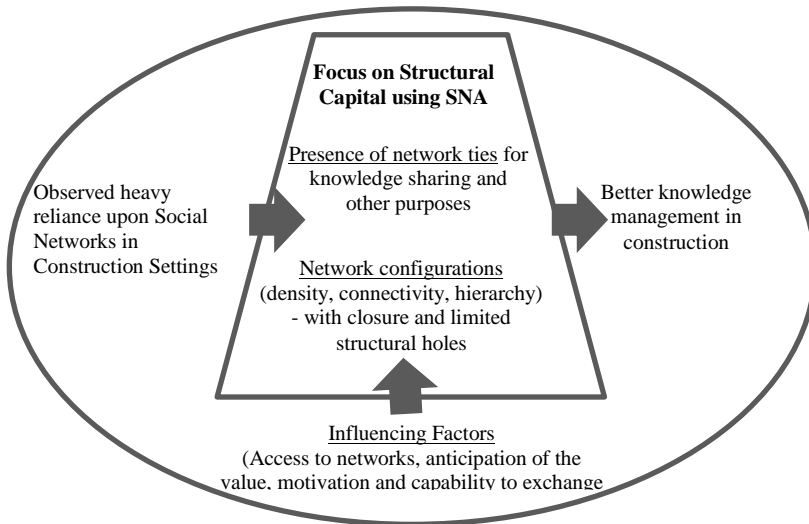


Figure 1, Research Framework

4. Proposed Research Method

The case study research methodology will be used for this research. Accordingly, five contracting firms operating in Sydney region in Australia will be selected for this study. These case studies involves interviewing key management level participants in the selected construction organisations based on a structured interview guide. The data will be used to develop the network patterns using Netminer SNA software. Data analysis will further include a quantitative analysis phase, where the key influencing factors identified through the literature will be compared with the identified network patterns.

5. Conclusions and Way Forward

The aim of the study is to investigate how structural capital could be used as an effective enabler in disseminating project knowledge within construction

organisations to improve organisation performance and learning. The literature review indicated that the organisational structural capital nurtured through its key drivers namely: network ties and network configuration and enabled by conditions such as access to networks, anticipation of the value, motivation and capability to exchange would effectively enable the project knowledge dissemination process within construction organisations.

A solid empirical phase that enable to quantitatively analyse the network configurations need to be carried out to identify strong networks and the factors that enabled these. This forms the way forward of this research study as given in the proposed research method.

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