

HOW CAN SUPPLY CHAIN MANAGEMENT PROLIFERATE IN SOUTH AFRICAN CONSTRUCTION?

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Noted interdependencies affects how activity coordination is approached in construction as actors have to constantly adjust and direct activities and resources in and between numerous supply chains and construction sites. This is one of the reasons why process effectiveness and efficiency have been the focus of supply chain management (SCM), mainly in a project based context. Due to the documented need to enact efficiency in construction, an exploratory case study was conducted on a general contracting (GC) firm based in a South African region. Insights gained from the study show how the concepts inherent in SCM is understood within the firm; how the coordination of production processes affect the creation of value demanded by clients through the GC; and the transaction governance structures that are often used within supply chains by the GC. The insights from the case study suggest that there appears to be a major scope for the implementation of SCM in the practice of construction management in South Africa. In other words, the attempt to drive project performance improvement through a proactive management of the supply chain could prove to be valuable for project stakeholders in South Africa.

Keywords: construction, performance, supply chain management, South Africa.

INTRODUCTION

Key drivers of change in the industry are forcing firms in the construction setup to adapt and reinvent themselves for the sake of enhanced effectiveness and efficiency. Much of this adaptation is occurring in the supply chain as effective firms are essential to the success of construction projects (Sommerville and Craig, 2006). The supply chain is thus a focus for increased ways of creating value for clients as it is deemed to be a vehicle for performance improvement and innovation in the industry (Pryke, 2009; 2012). SCM in construction addresses the impact of the supply chain on site activities with a view to reducing cost and time spent on each activity (Morledge et al. 2009). SCM can also facilitate the transfer of activities from site to earlier stages in the process so that site production can be enhanced. Thus, managing supply chains involved in a project in an integrative manner provides an opportunity to capture value, and, then deliver expected client satisfactions (Edkins, 2009).

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However, for expected SCM related value to manifest, project factors in the form of the management of the design process, cost, and the entire construction process should be done with best practices in mind (Male, 2003). As an illustration, Male (2003) suggests that planning for the construction stage should start during detail design and it should involve suppliers within cluster groups; and project teams should endeavour to remove waste and engage in processes that could make quality checks redundant. While examples of events related to construction SCM that have made a case for its proliferation can be seen in developed economies (see chapters authored by Rimmer (2009), and others in Pryke, 2009), this is limited in developing economies. Gosling and Naim (2009a) contend that strategies such as a shift between supply chain structures, supply chain integration, flexibility, time compression and the development of a new product process improvement could enact performance enhancement in the engineered-to-order (ETO) sector (construction inclusive). The need to understand risk and uncertainties in terms of construction SCM shows that ‘flexibility’ could alleviate sources of supply chain uncertainties that are related to control, process, demand, and supply (Gosling and Naim, 2009b). The advantages of construction SCM does not override the complexities associated with its implementation. For instance, as individuals and / or firms gain autonomy, the coordination burdens tend to grow and then require organisational structures that are able to manage a range of commitment loops concerning project completion (Azambuja and O’Brien, 2009; Isatto and Formoso, 2011).

The next section of the paper presents the rationale for the study, which is followed by a concise overview of GCs as drivers of SCM in construction. The methodology highlight how the primary data were collected and the findings were summarized in the case study section. A succinct discussion then precedes the concluding remarks.

Research Rationale:

Although many South African based GCs have embraced quality related philosophies such as total quality management (TQM) over time (Rhodes and Smallwood, 2002; CIDB, 2011; Emuze and Smallwood, 2011a; Smallwood and Emuze, 2012), there appears to be ambivalence toward the holistic adoption of SCM. Thus, how a major GC goes about managing its supply chains in South African construction became the focus of this study. This is important as major health and safety (H&S) failures, rework and cost overruns are often blamed on project parties that are under the control of GCs (CIDB 2004; 2009). More importantly, with the expected increased investment in the industry in South Africa (Pillay, 2013), the management of subcontractors and suppliers working for GCs is crucial for profitability and business survival in the sector. In other words, the monotonous management of supply chains could also limit performance progress in the sector.

CONTRACTORS AS DRIVERS OF SCM: AN OVERVIEW

The construction management literature indicates that the client or the contractor can champion the implementation of SCM in construction. Male and Mitrovic (2005) offer a useful way of thinking about supply chains by distinguishing between the types of supply chains. They say project supply chain (PSC) is a direct response to a client requirement, and organisational supply chain (OSC) describes the main contractor as a business entity or organisational supply chain. Building on the airport and airline analogy of Male (2002), which saw the main contractor as the supply chain ‘hub’, meeting various client needs by managing various project-specific supply chains, they drew a distinction between PSC and OSC.

The notion of an OSC is particularly interesting as it draws attention to the main contractor's ability to manage and influence a number of project-specific supply chains for different clients, irrespective of the clients' inclination and ability to utilise SCM. This distinction recognises that main contractors with sufficient organisational and economic size, as the hub of numerous supply networks, have the ability to develop their organisational supply chain and provide numerous highly differentiated clients with the resulting benefits. This is based on the premise that sustained high levels of demand are needed to maintain standing supply chains, whose members are willing to invest and innovate for the benefit of a single client. The main contractor's ability to form long-term relationships with subcontractors stems from its ability to provide a multitude of clients with benefits of an OSC, irrespective of the client's disposition towards SCM (King and Pitt, 2009). Main contractors, as 'hubs' in the constellation of demand and supply chain systems, derive their competitive advantage from balancing the competing needs of these different requirements within PSC through organising the procurement and management of their own multi-project supply network (Male and Mitrovic, 2005).

In this extended role, contractors are ideally placed to increase their market power and become supply chain leaders working directly for clients on a more regular basis. Their supply chain strategy becomes one of assembling the right teams, at the right time and in the right locations to build various built environment fixed assets for clients. The aforesaid shows that the construction supply chain is simply a network of firms that agreed to work together in order to realise objectives relative to construction projects. The days of vertical integration or rather the era whereby a single firm can singly realise a construction project can be deemed to be simply over for now. Prevailing circumstances in the industry necessitates a proactive approach to the management of actors / and firms involved in project conception and realisation. Venkataraman and Pinto (2008) elaborate on the topic when they contend that as a direct result of factors such as globalisation, best value for customer money, inventory management, and complexities, risks and uncertainties attached to projects, it is necessary to adopt SCM approaches in construction. According to them, project supply chain complexities underscore the importance and need for project-based organisations to manage their total supply chain in a more formal and organised manner. They contend that SCM approaches such as partnering, information, and risk sharing can greatly reduce uncertainties and complexities attached to projects. In addition, management approaches that goes with SCM such as purchasing, distribution, and logistics will not only enable organisations to realise major gains through the elimination of wastes in the process, but also they should provide opportunities for businesses to improve their operations.

METHODOLOGY

The initial stage of the study adopts the use of a single case study because at the centre of the case study as a research method lie context-dependent knowledge and experience, which are central to expert activities (Flyvbjerg, 2011). More so, a detailed scrutiny of a single example of a class of phenomena may be useful in the preliminary stages of an investigation since it provides hypotheses that can be tested with a larger number of cases in a future study (Flyvbjerg, 2011). The objective of exploratory studies is not to test or to confirm a specific hypothesis. Rather it is done to familiarise the researcher with the subject matter so as to make it more explicit. According to most qualitative study authors, the case study (which focuses on

contemporary phenomena rooted in a real-world context) must be used when the objective is to know more about a specific topic in which control of the events are limited.

Thus, the data were collected through on-site face-to-face interviews in the month of July in 2012. The data were tape recorded before transcription. The data were analysed in a thematic manner based on the interview questions. The interviews were designed to collect data on the extent that the firm understand the concepts of SCM in construction, the transaction governance structures that can be identified within the supply chains working with the GC, and the characteristics of SCM in South African construction as perceived by the GC.

The firm that was studied had 4 on-going projects inside, and around the Nelson Mandela Metropolitan University (NMMU) in Port Elizabeth at the time of the fieldwork. A unique element of the case study is that the GC has over the years served as employers of construction management graduates of NMMU and targeted research have been conducted on behalf of the firm at the NMMU Unit for the Study of Construction Processes (USCP). In addition, such targeted research endeavours examined how quality and health and safety (H&S) can be improved in the firm. At a regional level, the GC has received a number of H&S awards from the Western Cape Province where it has its main operations. The selection of the GC was purposive in that the firm is noted for extensive use of subcontractors and suppliers for project delivery. The next sections provide an overview of the background of the GC and the interviewee as well as the practice based responses that were recorded in the fieldwork.

FINDINGS - THE CASE STUDY

In terms of the background, the firm is a general contractor that is focus on non-civil engineering projects – buildings and other non-residential projects. Rather than executing all that is involved in a project, the GC can be considered as a construction management firm that make use of subcontracting extensively. The firm operates in more than one province in South Africa, although it is still very far from being considered a national entity. Established in 1985 in Cape Town as a building firm, the firm over time specialised in design and construct and later venture into general contracting by the late 90s. The board of directors of the firm is headed by a CEO that has extensive experience in the industry. The size of the firm in terms of turnover is about R750m (£48.5m) annually and in terms of employees, the firm employs a total number of 120 permanent staffs.

With the permission of the top management of the firm, an hour long semi-structured interviews were conducted with the Commercial Manager of the firm twice. The interviews took place on-site inside NMMU. The Commercial Manager position in the firm entails the procurement of projects and contract management. The interviewee has been with the GC for over eight (8) years at the time of the interview. The interviewee is a holder of a BSc and MSc construction management qualifications from a South African university. Apart from demographic information, the interviewee responded to two (3) main open-ended questions and 1 close-ended question. The open-ended questions had forty-three (43) sub questions, while the close-ended questions had nineteen (19) sub questions.

PERCEPTIONS OF SCM IN THE FIRM

The first main question asked the interviewee the extent that organisations understand the concept of supply chain management in construction. In responding to this, the interviewee opined that SCM is not formalised as it is erratic in construction when his experience is taken into consideration. However, the interviewee suggests that SCM can be viewed as organised bodies that endeavour to be efficient in their collective undertakings. He went further to say that the firm perceives a supply chain to be an organised group of suppliers that are committed to providing products and services to the GC.

When asked how relationships between project parties affect the entire supply chain, the interviewee was of the opinion that relationships between the client and the entire supply often improve project delivery; relationships between suppliers and the entire supply chain may foster collusions that is on the rise in the industry; and the effect of the relationship between the GC and project consultants on one hand and the entire supply chain on the other hand could improve project delivery. It is however notable that the interviewee was unable to mention the interdependencies that are evident in supply chains, although he suggests that a reliable database constitutes a tool that is synonymous with SCM in the firm. Based on the perceptions of the interviewee, having a reliable database of professional suppliers is a significant benefit of SCM. The interviewee however noted that the benefit can be marginalised by price fixing.

Using on-going projects and past projects of the firm as the point of reference, the interviewee was asked “how does the coordination of production processes affect the creation of value required by your clients?” The interviewee responded by saying that productivity measures and cost reports were often used to monitor efficiency in their site operations. Late material delivery on some of their sites does affect operational performance through delays that affect the entire project. It is notable that despite a number of initiatives that are put in place, half of the time, late delivery of materials to sites is experienced by the GC according to the interviewee. For instance, the interviewee said that the GC usually buys materials as they are needed; makes purchase arrangements with suppliers on time; specifies the quantities and dates that materials are needed on site for suppliers; and in some cases, the firm would have to buy and stockpile materials off-site for a later use on site in order to avoid delay.

The latter usually lead to increased inventory cost allocated to such projects. In addition, the interviewee affirms that they are able to keep track of material delivery and related activities because each site has a dedicated store man who is mandated to check materials upon delivery. He cited several cases where materials were returned to suppliers because they fail to comply with specifications. The GC often encounters either late delivery of material or the delivery of sub-standard materials. To this end, the GC makes it a point to check the work of subcontractors and suppliers thoroughly and quality sheets are always used to evaluate the performance of such subcontractors and suppliers. This must be done as poor quality and late delivery or completion constitute major issues that are related to the work done by subcontractors on some of their project sites. The interviewee illustrated how the firm ensures that subcontractors and suppliers deliver project related commitments, so that client satisfaction can be assured. In essence, long-term relationships are developed with suppliers and subcontractors that are able to perform to the satisfaction of the GC. Improved products and services as well as preferential rates are some of the benefits of such relationships mentioned by the interviewee.

TRANSACTION GOVERNANCE RELATED ISSUES

Issues pertaining to transaction governance structures that can be identified within supply chains constituted the main theme of the third open-ended question. The interviewee noted that the firm often make use of the best combination of price and quality as the criteria for the selection of subcontractors and suppliers for their project needs. However, preference is always given to firms (subcontractors and suppliers) that are based at the location of projects. When asked for reasons behind this policy, the interviewee responded that local suppliers are more flexible and they have the added advantage of having the knowledge and understanding of the local industry. Nevertheless, the GC usually source for subcontractors through the Master Builders Associations (MBA) that are based in project locations and industry related referrals. Once sourced, the subcontractors and suppliers are used repeatedly for projects in their locations as long as their performance is not compromised.

The interviewee even noted that the GC seldom makes use of a subcontractor on a 'once off' basis. Selected subcontractors and suppliers are expected to sign an in-house contract agreement (bespoke) with the GC after a purchase order is given to them. Prior to the contract signing, required documents in the form of specifications and designs are made available to the subcontractors and suppliers. A combination of competitive tendering and negotiation is used to secure the services of subcontractors and suppliers in the firm. Although a non-performance penalty clause is included in the bespoke contract agreement with subcontractors and suppliers, performance incentives are obvious omissions in such contracts. The GC has however encountered disputes between itself and subcontractors and suppliers in its books according to the interviewee. The disputes often relate to lack of delivery on the side of the subcontractors and suppliers. It is notable that such dispute normally ends at the arbitration stage.

PERCEIVED FEATURES OF SCM

As aforesaid, a close-ended question was also asked. With a 'yes', 'no' and 'unsure' response, the interviewee was requested to answer certain questions that are intended to record the features of SCM in the South African construction context. The perceptions expressed by the interviewee were either positive (Table 1) or negative (Table 2). Table 1 shows that the interviewee perceive that there is a prospect of future collaboration between project parties in South Africa and every member of a project team can contribute to project decisions. Further, the interviewee was of the opinion that project parties tend to trade blames when problems occur by pinpointing each organisation that is responsible for failures. However, the top management related to a particular project have the ability to resolve problems and that performance related feedbacks are always relayed to project parties.

Table 1: Features of SCM in South Africa construction context (Positive)

Question	Response
Is there a prospect of future collaboration between project parties?	Y
Does everyone have input into project decisions?	Y
Do project parties trade blames when problems occur?	Y
Do project parties pinpoint individual organisation for failures?	Y
Is learning and experiences shared mutually between project parties?	Y
Are problems resolved by top management involved in the project?	Y
Is feedback related to performance given to project parties?	Y

In contrast, the interviewee observes that top management of firms involved in a project rarely commit themselves to mutual objectives. Thus, mutual objectives are not always achieved at project completion and profit sharing tends to be unfair. While long-term relationships have been promoted with its advantages, the interviewee opined that supply chains are not always focus on such relationships. Information sharing within the chain is not also open or free. The table indicates that problems are not constantly resolved at their level of occurrence and open book costing is not used by project parties. The interviewee noted that ‘reinventing’ the wheel of past mistakes is not avoided as lessons learnt suffer implementation problems. Performance measures on projects are not consistent, while performance reviews are not conducted, either formally or informally. In terms of risk management, the table shows that a balance cannot be found between risks and reward among project parties; and risks are often not allocated to the best party that can bear it.

Table 2: Features of SCM in South African construction context (Negative)

Question	Response
Does top management of organisations commit to mutual objectives?	N
Are mutual objectives achieved at project completion?	N
Is profit fairly shared between project parties?	N
Do supply chains focus on long-term relationships	N
Do project parties exchange information freely?	N
Is open book costing used throughout the supply chain?	N
Are problems solved at the same level where they occurred?	N
Are lessons learnt in order to avert future occurrence of similar issues?	N
Are there common performance measures in projects?	N
Is performance reviewed regularly either formally or informally?	N
Can balance be found between risks and reward among project parties?	N
Is a risk generally allocated to the best party that can bear it?	N

DISCUSSION

The main insight that emerges from this study is that formal SCM in South African construction has proved rather elusive and difficult to realise in practice, especially from the experience of the GC that was examined. The reasons why this is the case is

unclear from the study. Despite this impediment to proper collaborative working between the GCs and its supply chain, there appears to be some evidence of informal, but yet co-operative working with subcontractors that have long-term relationships with the firm. The work of Briscoe and Dainty (2005) may provide an explanation for this occurrence. Briscoe and Dainty (2005) suggest that collaborative relationships have the tendency to evolve more effectively when it is not constrained by the formal aspects detailed in a contract data. The informal management of the supply chain by the GC may well manifest in improvement since whenever longer-term relationships have evolved, the actors in the construction project have often developed effective systems of communication and information exchange to the extent of aligning their management systems for the benefit of the project (Briscoe and Dainty, 2005).

The number of subcontracting firms in South Africa that have risen in recent years due to the evolving nature of the industry (Shakantu et al., 2007; Emuze and Smallwood, 2011b), demands a shift in how contractors and their supply chain partners operates in terms of the management of the business of construction. For reasons not limited to competitiveness and survivability in a volatile market, firms in the industry should become alert to their approach to relationships when involved in horizontal integrative way of project delivery. Evidence from Sweden supports this argument. An analysis of economic data from the development of the national Swedish timber industry between 2008 and 2010 by Bjornfot and Torjussen (2012) indicates that the number of bankruptcies of SME in the northern Swedish timber industry were fewer than the national average. With two case studies, Bjornfot and Torjussen (2012) were able to show that the main reason for this pertained to the horizontal supply chain collaboration that existed among the firms. The collaboration entails 'flexibility' that enabled shared resources and capabilities among the collaborating firms.

The evidence of the benefits of a proactive approach toward SCM therefore suggests that the GC (and similar firms in the same situation) would gain if they consistently encourage long-term relationships where information sharing is open and free; lessons learnt on projects are shared to prevent future occurrences; and cost and profit issues are open to all project parties.

CONCLUDING REMARKS

The perceived ambivalence towards the use and / or adoption of SCM by South Africa GCs despite the widespread use of horizontal integration for project execution forms the main rationale for the study. With expected extensive use of subcontractors and suppliers in South Africa not slowing down in the near future, the management of these project actors is deemed to be vital to performance progress and profitability in the sector. The research strategy adopted the case study approach as when little is known about a phenomenon in a particular context, a single case can open up research questions and hypotheses that would form the core of a future study. The investigated GC provides a vivid example of construction management in practice in South Africa in that the firm makes use of suppliers and subcontractors to fulfil most of its obligated functions on site.

It was observed that management strategies that are synonymous with SCM are yet to be fully assimilated in the firm because only the possibility of a long-term relationship and the availability of a database constitute the main SCM approaches that are presently used by the firm. The perception of SCM in the sector is also not sophisticated enough for it to become a means of driving performance improvement in the firm. Nevertheless, the description and level of understanding of SCM that were

visible when interviewing the informant support the notion that there is a major need to adopt a proactive instead of a reactive approach to how subcontractors and suppliers are managed by GCs in South Africa. The insights gleaned from this single case study provide the basis for the compilation of three hypotheses, which include:

- Imbalance view of the relationships among subcontractors and suppliers involved in a project has engendered non-formalised and often erratic management of the construction supply chain in South Africa;
- The use of bespoke form of contract agreement that may excessively serve the interest of principal contractors when engaging the services of subcontractors and suppliers influences the outcome of project relationships, and
- The achievement of mutual objectives by project parties has become elusive due to the absence of commitments to same by top management of the firms involved in a project undertaking.

However, it can be argued that the compilation of a future conceptual framework should be able to refine the proposed hypotheses and then encourage their falsification / corroboration through a rigorous empirical research.

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