Proposing a framework to minimize challenges in the South African construction industry

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Abstract

Research in supply chain management barriers in the construction industries in developing countries such as South Africa has largely been overlooked. The aim of this paper is to propose a framework to minimize the supply chain constraints in the South African construction industry. To that end, fifteen (15) senior managers drawn from firms in the construction industry for their intimate knowledge and experience of the South African construction industry were interviewed. Five themes emerged from the primary data. These included supply chain collaboration, supply chain integration and coordination, logistics management, people related constraints, and systems and processes. In light of the primary data and the literature review, a framework for minimizing supply chain constraints in the South African construction industry was proposed.

Keywords: South African construction industry, supply chain management, supply chain constraints

Introduction and background

Like in many countries, the construction industry in South Africa plays an important role in the economy by way of providing the much-needed infrastructure to support economic growth and development, job creation, and gross domestic product (GDP) contribution. For example, the industry contributes about 3.9% to national GDP and employ in the region of 1.4 million people (Haupt & Harinarain 2016, Crampton, 2016; Durdyev, Zavadskas, Thurnell & Ihtiyar, 2018). Yet, according to Saidu and Shakantu (2017) the construction industry remains characterized by fragmentation, inefficiency, cost and time overruns, among other problems. Further, the temporary project-based nature of construction projects seem to hinder integration of construction supply chains

(Fayazbakhsh, Sepehri & Razzazi, 2013; Yadav & Ray, 2015). The notion and practice of supply chain management is still not as largely embraced as in other industries (Fernie & Tennant, 2014). The industry and individual firms have yet to appreciate the fact that in order to compete successfully these days, it is no longer enough to focus only on management, survival, growth and competitiveness of individual firms but that firms should begin to consider supply chains as a source of improving their own performance and competitiveness. This partly means that the construction industry needs to know what constraints exist within their supply chains which tend to render their supply chains inefficient.

With the exception of a few, studies in supply chain management constraints in the construction industry have been especially scant, few and far in between. The limited empirical research available was conducted in more developed countries such as the United States of American, Asia and Europe (e.g. Van der Veen & Venugopal, 2013; Zaghoul & Hartman 2013). Thus, it appears that empirical research in supply chain management barriers in the construction industries in developing countries such as South Africa has largely been overlooked. Yet, according to Ofori (2015) scientific research focusing on the construction industry remains an important avenue for the generation of such new perspectives. Hence, the current study was both relevant and significant in that it is intended to identify challenges existing in the construction industry supply chain with a view to proposing innovative ways of minimizing them, thereby contributing to the better performance of that industry. Thus, the aim of this study was to develop a framework which would enable the South African construction industry minimize their supply chain constraints.

The remainder of this paper is organized as follows: First, relevant literature on the characterization of the South African construction industry, supply chain management, and the theory of constraints is reviewed. This is followed by the description of the research methodology employed. Then, the research findings are discussed followed by recommendations made.

Characterization of the South African construction industry

As an important sector of the economy, construction includes the design, planning, building, maintenance as well as the demolition of structures and works (Bragança, Vieira & Andrade, 2014). Infrastructure and construction activity in South Africa has largely

been underpinned by the government's infrastructure investment programme. Construction is relatively labor intensive in that it uses a larger number of workers per unit output than most other industries and is an important employer of labor. The construction industry accounts for around 8% of total formal employment and around 9, 6% on average of GDP between 2008 and 2016 in South Africa (Construction Industry Development Board (CIDB), 2017). Poor performance of contractors in the South African construction industry has been identified quality as one of the predominant problems facing the industry (Tucker, 2014).

The construction industry, in general, is highly fragmented with significant negative impacts perceived low productivity, cost and time overruns, conflicts and disputes and resulting claims and time-consuming litigation (Modares & Sepehri, 2009). These have been acknowledged as the major causes of performance-related problems facing the industry (Van Weele & Arjan 2012). The application of supply chain management is a means of developing vertical integration in the design and production process and operation to link the process into a chain, focusing on maximizing opportunities to add value while minimizing total cost. As this application requires a significant shift in the mind-set of the participants toward collaboration, teamwork and mutual benefits, it is hardly surprising that only few sophisticated applications have been reported in the construction industry (Van Weele & Arjan, 2012).

Research methodology

Since not much research has been conducted in this area in South Africa, exploratory research was found to be relevant. In this regard, Cresswell (2010) posits that exploratory research is used when a researcher examines a new interest or when the subject of study is itself relatively new and unstudied. Purposive sampling was used in this study to select participants. According to Creswell and Plano Clark (2011), purposive sampling involves identifying and selecting individuals or groups of individuals that are especially knowledgeable about or experienced with a phenomenon of interest. These respondents who included fifteen (15) senior managers were drawn from firms in the construction industry for their intimate knowledge and experience of the South African construction industry. Following the informed consent and permission, semi-structured interviews were each conducted and were recorded using a digital voice recorder after which they

were transcribed in preparation for data analysis. Table 1 shows the profile of the respondents:

Table 1 - The profile of the participants

Participant code	Position occupied	Number of years in construction industry	Province
P1	Logistics manager	14	Gauteng
P2	Procurement analyst	12	Kwa Zulu-Natal
P3	Commodity manager	13	North West
P4	Senior buyer	10	Western Cape
P5	Head of procurement	14	Gauteng
P6	Procurement analyst	12	Mpumalanga
P7	Regional buyer	12	Easter Cape
P8	Chief Procurement officer	23	Gauteng
P9	Commodity manager	12	Easter Cape
P10	Chief Procurement officer	27	Limpopo
P11	Operations manager	16	Limpopo
P12	Head of Sourcing	15	Western Cape
P13	Head of procurement	19	Free State
P14	Senior buyer	11	Gauteng
P15	Plant and assets executive	22	Mpumalanga

Research findings and discussion

Five themes in the form of constraints emerged from the study – namely, supplier relationship management, supply chain integration and coordination, and logistics management, people-related constraints and systems-related constraints. Upon further analysis, the supply chain management constraints within the South African construction industry were found to exist at both the industry and firm level. Table 2 summarises the themes as follows:

Table 2 - Industry-level and firm-level constraints

Industry-level constraints	**Firm-level constraints**

• Supplier relationship management
  - Supply chain collaboration
  - Lack of trust
• Supply chain integration and coordination
• Logistics management
	• People-related constraints
	  - Lack of well-rounded managers
	  - Lack of competent staff in key areas
	  - Lack of training and development opportunities
	  - Disempowered staff
	  - Manage change
	• Systems and process related constraints
	  - Procurement systems and practices
	  - System integration and coordination

Five themes emerged from the study. These are supplier relationship management, supply chain integration and coordination, logistics management, people-related constraints, and systems and process related constraints:

Theme 1: Supplier relationship management

The interviews revealed poor collaboration with suppliers, customers and service providers as one of the challenges facing the construction industry in South Africa. A few respondents held that the construction industry is fragmented and that most firms operate like whose only focus is the technical aspects of building and the financial aspects of ensuring profit-making (P2, P8, P11). On this note, another respondent observed that at best the interaction with suppliers on operational aspects (P4). Responses from some respondents suggest that the due to its competitive nature there is often reluctance for collaboration and information sharing within the construction industry (P5, P3). One respondent indicated that working collaboratively to pre-qualify supply chain partners may potentially reduce the aggregate time necessary to assess the capabilities of suppliers

and sub-contractors (P4). Innovative technologies considered in this article are building information modelling (BIM) and location awareness technology (LAT) have been suggested to improve collaboration in the construction industry. It is believed that BIM technology, which is gaining popularity globally can be a catalyst for change, with information replacing documents and knowledge becoming an asset (Laura & Ayodeji, 2016).

Theme 2: Supply chain integration and coordination

On the question of integration and coordination with suppliers, P7 recounted "We wish that we had something that remotely resembles a supply chain system" while P4 explained "Very disjointed, does not support supply chain activities and there is no attention being paid to implement a system which truly and effectively controls and manages supply chain activities". Without an effective item and vendor master, spend segmentation will always present challenges, hence strategic sourcing becomes impossible and buying remains an ad-hoc administrative function which is costing the sector billions each year, mainly due to the inability to effective leverage its spend and/or manage its supply chain. The study shows that most construction companies have been reluctant to invest in system that would streamline processes to save time and cost. The fact of the matter is that low levels of coordination leads to various challenges and underperformance of the construction supply chain (Koutsokosta & Katsavounis, 2015).

Theme 3: Logistics management

On the question of logistics, P13 stressed that efforts to implement a logistics strategy, warehousing structure and inventory control is simply ignored and that notwithstanding the site based operations of construction, large quantities and value of inventory is held in various stages of operations and is neither controlled nor properly accounted for. The findings also shows that knowledge of logistics management is generally poor within the construction industry. P8 believes that competition and consequently customer orientation and cost consciousness have for a long time been weak due the fact that firms in the construction industry are unaccustomed to flow models or supply chain models. Lambert, Stock and & Ellram (2013) concur that proactive logistics can improve effectiveness and efficiency and thus reduce costs. According to Mabin et al., (2010) the adopting supply chain management is a necessity in order to be able to offer products that the vast majority of the market can afford to demand.

Theme 4: People-related constraints

The interviews further revealed the need to develop people in the relevant areas including people-related areas or in the so-called soft skills especially for managers. P15 commented that buyers have traditionally been regarded as order capturers and that the majority if not all existing buyers were not subjected to further training and development. P11 observed that *operational buyers are mostly made up of poorly qualified or trained individuals with an average of 10 to 20 years of service who are generally clerks that became buyers without much further development*. Another are that for many respondents is a major weakness is the ability of the industry to deal with change. In this regard, P12 pointed out that *change management is non-existent and at least 5 projects, initiated by the company and using external consultants has failed to be implemented at a high cost, mainly due to the company not being able to proceed beyond the resistant culture*. In the same vein, P2 highlighted *that nothing has fundamentally changed over the past 10 odd years of my experience. They keep doing the same things over and over.*

Theme 5: Systems and process-related constraints

Insofar as systems and processes are concerned P7 decried that *unfortunately there are no good tools, world class tools that we have available to us at the moment to enhance what we are doing*. P1 further observed that *the firm as a whole is not really mature in terms of the procurement practices*. Mesároš and Mandiák (2015) posit that the material flows generated between the principal contractor of the construction project and subcontractors are also involved in realization of a construction project, and some of them responsible for materials supply. Management of materials flows is essential to provide their most effective use, the information systems are of great help in this regard (Mesároš & Mandiák, 2015). Improving procurement and materials management systems can go a long way in enhancing the supply chain (Chong & Preece, 2014; Solanke, 2015).

Conclusions and further research

Given the comments from some participants regarding the manner in which inventory, logistics and distribution is handled, it is clear that the industry generally views these as disparate functions with no need to create an integrated supply chain. Change management within the sector is clearly a problem area and resistance to change is rife in some firms. Given the lack of exposure by entrenched and long serving managers to world

class management principles and practices, including advancements in supply chain over the past decades, these new practices will remain foreign to most long serving employees, and therefore any attempt to entrench new thinking and or concepts will face resistance. They will not change what they do not know or do not understand. The participants' comments about new blood being needed in the sector is true.

In light of these findings, the following framework to minimize the supply chain constraints is proposed for the South African construction industry and individual firms.

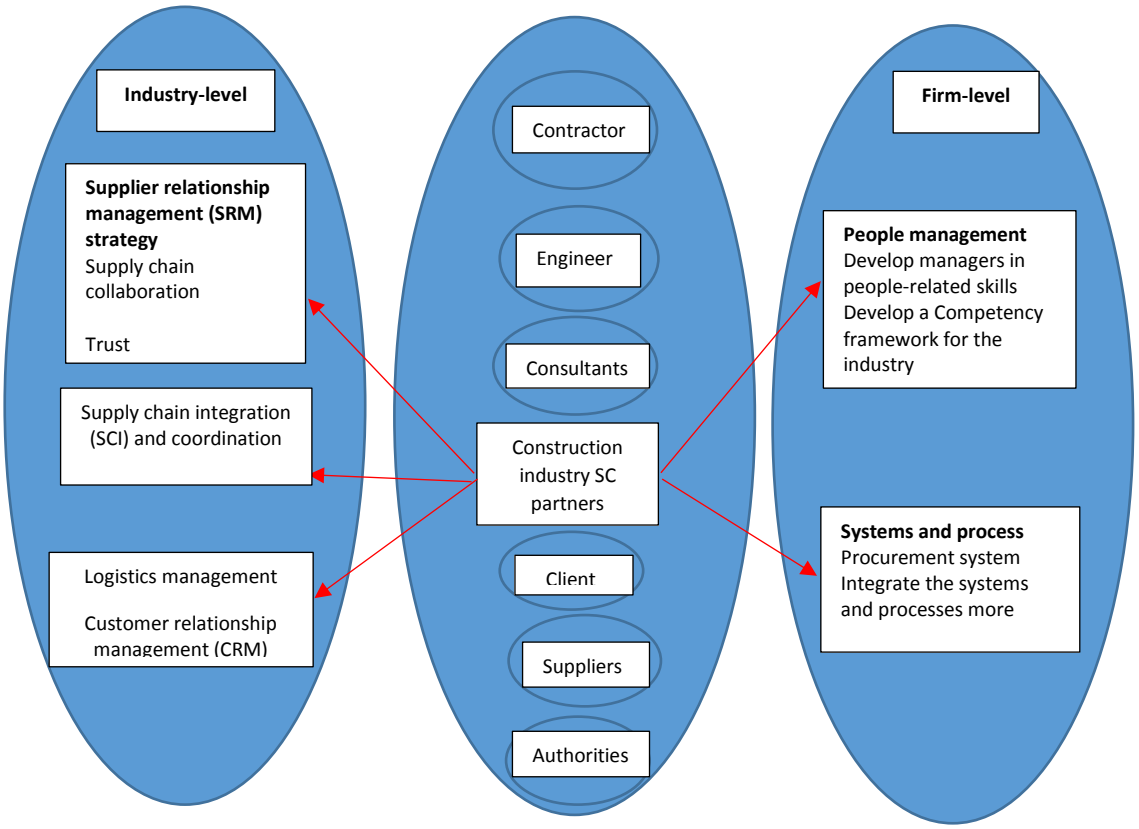

Figure 1- Proposed framework for minimizing SC constraints in the South African construction industry

The framework identifies two levels of SC constraints and how these can be minimized. First, the framework identifies industry-level constraints which could be minimized by means of a development of a supplier relationship management strategy, which will enable the main contractor define and successfully manage the relationship with suppliers. The SRM strategy should pursue collaboration at a strategic level with suppliers whilst seeing how the various SC partners can work on improving the trust levels. Once collaboration has been clarified at a strategic level, the partners should investigate how the collaboration can be enabled through SC integration and coordination

efforts. Equally important is the development of a customer relationship management (CRM) strategy which will enable the main firm to define the customer value proposition and find ways to keep the customer as the focal point of business. Key to ensuring the customer value proposition is ensuring effective logistics, which is a lifeblood the construction industry. At the individual firm level, the SC chain partners need to prioritize training and development for technical and non-technical skills, and begin to develop a competency framework for the industry. Investing in effective systems in the areas of procurement and materials management for the firm is imperative if the firm and the industry are to optimize on their supply chains. This study could be extended to other industrial sectors that are critical to the South African economy, such as transport, manufacturing and production. This provides a basis for comparisons. Future studies could focus on correlating the supply chain constraints identified in this study and supply chain performance in the SA construction industry in order to uncover the influence of these constrains on SC performance.

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