

[DOI: 10.20472/BMC.2017.006.009](https://doi.org/10.20472/BMC.2017.006.009)

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A DIAGNOSTIC REVIEW OF THE BARRIERS TO SUPPLY CHAIN MANAGEMENT IN CONSTRUCTION SUPPLY CHAINS

Abstract:

The construction industry is one of the largest contributors to the global economy. It has, however, been experiencing noteworthy challenges due to multifaceted factors, some of which are related to supply chain management. In this study, we identified the barriers to supply chain management in the construction industry and how these can be overcome. A review of related literature was conducted, after which a qualitative approach was adopted for the empirical portion of the study. The latter involved two focus group interviews and 15 semi-structured interviews held with supply chain managers drawn from the South African construction industry. A thematic analysis of responses revealed seven themes, namely procurement practices and capacity, construction supply chain management structure, supply chain integration, relationships and coordination in supply chains, supply chain collaborations, supply chain leadership management and logistics management. These themes represent the barriers to effective supply chain management and signify areas deserving attention in the diagnoses of supply chain related problems in the construction industry. The study concludes by suggesting practices that could be implemented to overcome these barriers.

Keywords:

Construction industry, supply chain management, procurement practices, supply chain integration, supply chain collaboration, supply chain leadership management, logistics management

Introduction and Background

Construction supply chains in all countries face many difficulties and challenges. However, in South Africa, the problems facing the construction industry in South Africa appear to be significantly more fundamental, more serious and more complex. Whilst in all countries, the construction industry faces conditions of uncertainty and risk, the sources of such risk are more severe in South Africa and may include instability, low productivity, unskilled labour force, corruption, government influence and informal sector activities (Construction Industry Development Board, 2016). A study by Emuze and Smallwood (2013) confirms that the South African construction industry is under pressure due to a combination of factors such as skills shortages, lack of standardisation, delays in payment, increased fee competition and variable quality. A report by the South African Federation of Civil Engineering Contractors (2014) on the status of the construction industry in South Africa highlights that only about half of the projects are delivered on schedule, within the budget, relatively defect free, and that there is low satisfaction with the performance of contractors and consulting professionals. In their discussion of some of these challenges, Dlungwana, Nxumalo, Van Huysteen and Noyana (2002) identified quality of outputs as one of the predominant problems facing the industry. These difficulties and challenges sit alongside the general situation of socioeconomic stress, chronic resource shortages and a general inability to deal with key issues (Bolton, 2007).

Despite the challenges that it faces, the construction industry remains an important contributor to the South African economy. The industry is responsible for the planning, design, construction, maintenance and eventual demolition of buildings and works (Ojo, Mbohwa & Akinlabi, 2014). It is essentially a service industry that obtains its inputs and outputs from various sectors of the economy with which it is interrelated and interlinked, often in quite complex ways (Loxton, 2004). The importance of construction derives from its role in the generation of constructed physical facilities and in employment, which in turn, play a critical and highly visible role in the development of the country. Construction encompasses all civil engineering work and all types of new building projects (including housing), as well as the maintenance and repair of existing facilities (Fenn, O'Shea & Davis, 1997). In South Africa, as much as one half of the total construction output may be

in civil engineering projects such as transport facilities, power projects, irrigation, drainage and water supplies, among others (Loxton, 2004). Housing generally makes up less than one third of the total output. The remainder is in other buildings such as hospitals, schools, offices, factories, hotels and agricultural buildings.

Supply chain management has become a central issue for many organisations as it offers the prospect of making significant cost savings and improving value by enabling companies to work more effectively together across the entire supply chain (Van Weele & Arjan, 2012). Its main goal is to reach solutions with optimised profit for all supply chain partners. However, there is often a great disparity between potential benefits and practice, since there are several difficulties or barriers in supply chains, which need to be solved through efficient supply chain management practices (Simatupang & Sridharan, 2012). According to Waller (2003:677), barriers pertain to anything that blocks an organisation, a process or a system from optimising its output or achieving its intended objectives and goals. Some barriers are physical in nature, with typical examples being insufficient plant capacity, labour, capital, raw material and land (Hugo, Badenhorst-Weiss & Van Bilton, 2004). Other barriers may be of a non-physical nature, which include poorly motivated employees, worker absenteeism, lack of training, poor operating procedures, lack of flexibility on part of the union and bad scheduling (Goldratt & Cox, 2000). Additionally, very long lead times, large numbers of unfulfilled orders, high levels of unnecessary inventories, the lack of relevant inventories, large numbers of emergency orders, high levels of devolution, lack of key customer engagement, frequent changes and the absence of control related to priority orders also form part of supply chain barriers (Dettmer, 2013). Such barriers occur when there are materials or units accumulating upstream because the next operation has insufficient capacity to accept the load (Waller, 2003).

Within the context of the South African construction industry, supply chain management involves integrating the operations of all organisations involved with the delivery of a particular product or service (Shakantu, Tookey, Muya & Bowen, 2007). Supply chain partners in this industry act as a similar entity, thereby ensuring that profit and performance are enhanced throughout the supply chain (Van Der Merwe, 2008.). Flores

and Primo (2008) affirm that the needs of the market in the South African construction industry have made the supply chain management process increasingly complex. It is characterised by higher levels of demand and the need for high quality outputs, which many of the smaller players are unable to meet, especially when related to achieving a competitive advantage. Additionally, in this industry, supply chain partners have not been achieving the gains related to profitability and efficiency. This is because in general each entity tends to consider and prioritise its own local barriers, when in fact it should be holistically considering all global constraints related to supply chain management (Flores & Primo, 2008). The current state of affairs contradicts the suggestion by Wang, Lin and Liu (2012) that the design and analysis of the supply chain as a whole are critical to develop an efficient supply chain management system. Therefore, continued discourse and research on supply chain management within the construction industry in South Africa is necessary in order to keep abreast with developments.

The purpose of this study is to examine barriers supply chain management in the construction industry in South Africa. An analysis of previous research shows that research gaps remain and still merit empirical attention. For instance, a study by Chihuri and Pretorius (2010) examined risk for success in a South African engineering and construction project environment. Emuze (2011) investigated the improvement of performance improvement in the South African construction industry. Antony (2013) focused on the legal regulation of construction procurement in South Africa. Aigbavboa and Thwala (2014) directed their attention to the major causes of construction disputes in the South African construction industry. Ojo *et al.* (2014) compared green supply chain management practices in the construction industries in South Africa and Nigeria. A more recent study by Wandipo (2016) concentrated on skilled labour supply in the South African construction industry. Whilst these studies and a few others positively contributed to the body of literature on the South African construction industry, literature focusing on this industry is generally limited and could be improved. In particular, there is a dearth of research on most supply chain management issues in the same industry. In view of this, ample space exists for the further examination of barriers to supply chain management in this industry. Identification of these barriers could be an important diagnostic tool when

dealing with supply chain management performance issues in developing countries such as South Africa.

Research Method

This study adopted a qualitative research design, in order to gain an in-depth understanding of barriers to supply chain management within the construction supply chain in South Africa. After a review of related literature, purposive sampling was employed to recruit junior and senior managers from different firms operating in the construction industry in South Africa. Data were collected by means of semi-structured in-depth interviews. The structure of a semi-structured interview was organised around an interview guide. This contained topics, themes or areas to be covered during the interview, which were tailored to address the aim of the study. The interviews were held at designated sites after an informed consent document, as well as permission from the key stakeholders had been obtained. Each interview lasted for a period ranging between 20 and 30 minutes. The interviews were recorded using a digital voice recorder, and permission to record these proceedings was sought from each participant prior to the interviews. Saturation was reached at 15 participants, at which it was deemed that further interviews would not yield any more useful data since the responses from participants were now almost identical.

Data Analysis

Before analysis, a trained professional transcriber was tasked to transcribe the data collected from the in-depth interviews from the voice format into a text format (Kvale & Brinkmann, 2009). Subsequently, the interview transcripts were read through a number of times in order to draw out the key points and themes emanating therefrom, in a process known as content analysis (Maxwell, 2005). Certain themes began to appear after the data transcripts had been read numerous times. The themes were then grouped into more manageable groups of sub-themes, before a summary table of the main themes originating from the participants' views was drawn up (Thorpe & Holt, 2008). These themes were the findings and formed the basis of the conclusions and recommendations for this study.

Ethical Considerations

The research was conducted in a manner that ensures its academic integrity and scientific validity. In this regard, four measures of trustworthiness were considered, namely, credibility, confirmability, transferability and dependability. Credibility was ascertained by making comparisons on the data collected from interviews with participants, field notes and those obtained from the literature sources. Confirmability was established through a confirmability trail to ensure that recorded raw data had indeed been subjected to a process of analysis, reduction, and synthesis. Transferability was determined by comparing the context of this study to other construction supply chains in other regions of South Africa. Construction supply chains in these different contexts were considered homogenous, and hence were comparable, allowing the results of this study to be generalised to the rest of South Africa. To address dependability, research processes within the study were reported in detail, thereby enabling future researchers to replicate the same study and possibly obtain similar results. In addition to the above, the privacy of participants was observed and their anonymity was maintained throughout the study. Permission to conduct the study was obtained prior to any interviews and participants' right to non-participation and protection from harm were observed. Still, a research introductory letter was sent to each participant after their acceptance to participate in the interview. The letter provided an undertaking of confidentiality between the researchers and each participant.

Results

After content analysis, six themes emerged from this study, listed below:

1. Limited capacity.
2. Time management.
3. Coordination of professional roles.
4. Strategic leadership.
5. Resistance to change.
6. Strategic supply management practices.

Theme 1: Limited Capacity

It emerged that firms have limited capacity in undertaking critical supply chain management activities. Participants highlighted the lack of excellent and useful tools to use in their daily routines and they lamented the heavy dependence on manual systems, especially within the procurement function. This is illustrated in the excerpts below:

- “Unfortunately there are no good tools; world class tools that we have available to us at the moment to enhance what we are doing, a lot of what we do is done manually and I think the size of the team within procurement is indicative of that as well”.
- “We cannot have too many people do stuff manually, the cost is exorbitant so the route that I see that the company has gone is that to say yes is reduced to a few key people that will keep things going but really we need better tools to provide a better service”.
- “We still use a manual requisition system and not an electronic system. That matter was brought up last year and at that stage it was decided that the manual system works well and we don’t have a problem with manual requisitions but if it is going to make our lives a bit easier in procurement I am all for going the electronic route”.

Another participant bemoaned the lack of training, development and performance management in his firm, as reported below;

- “There is no training, no development, no key performance indicators and no performance management but we then get average increases although no one can tell us what they measured us on”.

Theme 2: Time Management

Management of time emerged as an important issue affecting the construction supply chain. Participants highlighted that they did not have adequate time to focus on project needs and to dedicate to supply chain management activities. The following comments from participants illustrate the effects of time management on the operations of construction firms.

- “Time is an issue that’s not always there because as soon as you get a project there is a lot of things that needs to happen before you actually do the start-up. So time is an issue but if you have your processes and your data in place already then there is no reason for it to not work better”.
- “There is not enough time for the estimators or estimating team to put the tender enquiry documents together properly. So when you eventually as the operations manager receive the subcontractor documentation, you have to have discussions with the subcontractors or engage with them in order to conclude a contract”.
- “So I think the time required to put a proper bid or a request for quotation together is usually too short. So that is from handover from tender to execution? See I think from an execution point of view we generally get led by who is the cheapest”.
- “I haven’t specified this one as this is more than a risk, if you take the time constraints into account when we require other subcontractors the full contract conditions and obligations, is not made aware to the subcontractor, so that applies to normal things such as doing the drawings and or the final points of the contractual requirements and then after the award of the contract, then you find guys we need more of this or not enough. I find this as a short coming and a risk”.
- “We get a price from various suppliers and in most cases they cannot fix them for longer than 30 days. By the time the job gets started you could be looking as much as six months to a year later that the materials have to be ordered”.

Theme 3: Coordination of Professional Roles

In any organisation, it is important to coordinate different roles in such way that they augment and complement each other, leading to improved performance. However, this is not so with the construction supply chain in South Africa, where there appears to be conflict between supply chain management roles. A common conflict exists, for instance, between departments such as operations, buyers and strategic sourcing, as they battle to assume responsibility for more important tasks. These clashes are demonstrated in the comments below:

- “Generally, there is lack of structures, lack of skills, definitely a lack of communication. We hope that the new executive will implementing a strategic sourcing structure to ensure that 90% if spend is managed via supplier contracts”.
- “We battle to differentiate between buyers versus strategic sourcing roles and responsibilities. Because buyers tend to do as operations tell them to do, the strategic sourcing teams find it difficult to actually do their jobs”.
- “The sourcing guys are trained, qualified and skilled - the buyers are not and the company has not figured this out as yet. In essence, poorly qualified and or incompetent buyers are spending billions in this sector”.
- “Problematic as there is a constant war between operations, buyers and strategic sourcing. Without a firm structure anything we do is hitting a brick wall. I think half of strategic sourcing’s efforts are wasted as buyers ignore recommendations”.
- “I understand constraints to be hurdles that we need to overcome or that influence the way we do business. If I were to be honest, the processes are flawed, there is no segregation of duty, no structured approval process and people constantly commit the company to spend without a purchase order. I am almost certain that the company is losing vast sums of money simply because too many ‘buyers’ exist in this company with the ability to spend money”.

Theme 4: Strategic Leadership

Responses put forward by participants indicated that there is an apparent lack of strategic leadership within construction firms. Issues raised included that senior managers did not understand the role and importance of supply chain management in construction, lack of strategic planning, the lack of management support for supply chain management activities and ineffective decision making. These concerns are captured in the following excerpts:

- “I really do think that a lot of people in senior roles in this business don’t understand the benefit they can extract from supply chain management; they see it as almost a necessary evil and not a real value add. I don’t think it’s through any fault of their own, more a matter of it how it’s always been”.

- “Lack of planning is a huge constraint and a lack of visibility of supply chain activities further contributes to losses”.
- “Leadership is lacking and there is no visible support for supply chain initiatives and also visibly dealing with non-compliance”.
- A lack of buy in and management understanding of what we do. Irrespective of how qualified or experienced an individual is in this company, we are considered second class citizens in that only contracts’ managers, quantity surveyors and engineers are respected. Titles mean a lot in this company”.
- “There is no real strategic approach to supply chain that I can see. It’s ADHOC and driven by a programme which in itself could be a plan I suppose, which is good. I’m not aware of any supply chain professionals in this company who are applying their minds to the supply chain”.
- “Beginning with a lack of strategic decision making and supplier selection at the tender stage”.

Theme 5: Resistance to Change

The study demonstrates that there is a culture of resistance to change in the industry, which disrupts advancement, presents a cost and reduces industry profitability. This is shown by following the comments from participants:

- “There are three distinct supply chain/ procurement structures in our company - the first is the strategic sourcing division made up of highly qualified strategic sourcing specialists and commodity managers and reports to corporate as a support function to the entire group. The second is the operational buyers reporting to each business unit and that are more administrative in nature. They are made up of poorly qualified or trained individuals with an average of 10 to 20 years of service. They are generally clerks that ‘became buyers’. The third are the engineers, quantity surveyors, site agents, commercial and contracts managers that appoint sub-contractors and decide the suppliers for high value bulk items. This tends to cloud the supply chain as policies, processes, actions, orders as well as suppliers are not visible due to

poor systems. Unfortunately, no one seems to be concerned about changing the status quo”.

- “As a large volume of decisions and large value of spend takes place between the buyers and operations, it is clear that world class practices are not taken into account and large spend is not subjected to expert scrutiny. There is a constant tendency to revert to previous suppliers, or using favoured suppliers and this creates complacency within the supplier base”.
- “Construction is undeveloped in terms of business skills, business processes, business experience outside of construction and the ability to embrace new concepts”.
- “No one follows policy and nothing happens. The people that are not in buying make the decisions and again I cannot say anything. This culture has always been in place and managers call the shots and they are more senior so what can we say”.

Theme 6: Strategic Supply Management Practices

Strategic management practices emerged as an important theme. Participants reported on the general lack of strategic planning and supplier selection, ineffective tender processes and unsatisfactory procurement practices. These issues are demonstrated in the excerpts below:

- “Lack of strategic decision making and supplier selection at the tender stage. This is further compounded by short timelines associated with preparing and submitting a tender to a client”.
- “It is clear that the best prices are not used in the tender and that a lack of competitive behaviour exists amongst suppliers at this early stage. Further, suppliers escalate their prices, knowing that the buyers and operational staff will return to renegotiate the final price in order to ‘beat the allowable”.
- “The company further does not have a consolidated view of its supply chain activities and current systems do not support strategic decision making. A lack of item masters as well as a consolidated vendor master further detract from the ability to conduct strategic sourcing initiatives”.

- “Procurement is very immature in this business but we are starting to see some good examples where procurement is starting to add value as it should but we need to educate our internal customer and sell the benefits of procurement to them. Only then, I think, once we have done that, will we start to see more buy in to the procurement philosophies”.
- “We have spend data, but cannot do spend analysis in the absence of an item master. Communication and acceptance of supply chain principles is still problematic, so even though we are sometimes included, it could change the next day if someone else takes over”.

Discussion

The responses provided demonstrate the severity of the constraints within the construction industry in South Africa. Actual assessment of the situation shows that most systems are ineffective and that many problems exist. The responses from participants further indicate that firms have not kept pace with the view that supply chain management is meant to offer new ways to reduce costs and drive efficiencies aimed at improving strategic decision making and control. In this regard, reference is made to a study by Mattsson (2009) who discusses overlapping processes with a focus on players and relationships that connect different supply chain networks. The study concluded that the actions of supply chain players influence the strategic actions and network processes in the entire networks. This could perhaps explain that the lack of strategic decision making in the appointment of suppliers and subcontractors will continue to impact project delivery in both quality and cost as disjointed supply chain networks continue to surface in the construction supply chain. Subcontractor and supplier appointments on large projects encompass the largest spend, inventory base and present the single biggest opportunity for cost savings and control. In the same way, they create the area with the most risk and therefore reinforces the need for greater strategic control in the construction supply chain.

The findings further show that the role of strategic supply management is underestimated. The idea that people in different structures of firms do not understand and appreciate the

underlying principle of procurement, due to their lack of training and competence in supply chain management suggests that proper procedures are not being followed. Strategic approaches should endeavour to align all resources in firms; most importantly, people and systems with the focus on issues that may impact supply chain activities. The goal is to reduce costs and duration of site activities. In this case, the primary thought is to ensure dependable material acquisitions and labour flows to the site to avoid disruption to the workflow. This may be achieved by simply focusing on the strategic relationship with key stakeholders, especially between the site and direct suppliers. When critical players in an organisation work independently or in silos, the operation of the organisation is affected negatively, which invokes the need to coordinate the efforts of internal all strategic partners.

The findings of this study concur with the conclusion of Rust *et al.* (2013) that most firms in the South African construction industry agree on the importance and potential benefits of supply chain management but they struggle when seeking to evolve from theory to implementation. Management of cross-organisational processes, as required by the modern supply chain approach, is a serious challenge, particularly as most firms still struggle with internal process management. Consequently, firms need to manage their internal processes properly before venturing into the cross-organisational level. The extended functions of the supply chain stretch the processes at either end, representing a virtual network of partners. Demand and supply collaboration between partners necessitates that the whole supply chain reacts quickly to any changes and capitalises on its ability to fulfil demand optimally. Thus, analysis of these problems has shown that a major part of them are supply chain management problems, manifesting at the interfaces of different parties or functions within the firm.

Conclusions and Implications

The aim of this study is to investigate internal barriers to supply chain management in the South African construction supply chain. The construction supply chain assumes a critical part in the economic development of any country by making a huge commitment to the national economy, in terms of job creation, undertaking a part in the development and exchange of innovation, and improving the quality of life of the users of its products.

However, construction supply chains remain susceptible to a myriad of barriers, which threaten their viability and optimal operation. In depth interviews with 15 junior and senior managers drawn from firms operating in the South African construction industry revealed six major barriers, namely, limited capacity, time management, coordination of professional roles, strategic leadership, resistance to change, and strategic supply management practices. Each of these barriers tends to hamper supply chain management and represents an area for potential growth.

The study is not without theoretical and managerial implications. Theoretically, it contributes to the literature on supply chain management in construction supply chains in developing countries such as South Africa. In this manner, the study provides a foundation on which further local research can be conducted for the improvement of supply chain management in the construction industry. Practically, several strategies can be put forward, which can lead to the easing of the identified barriers. To build the capacity of firms in the construction supply chain, more state of the art supply chain technologies in the form of hardware and software should be adopted. This may facilitate better agility and high quality outputs that enable firms to expedite supply chain management processes. Processes that are interrelated or dependent on each other must be either coordinated or completely integrated to ensure smooth and faster exchanges between functions and activities. In addition, change management programmes could be put in place to counteract the resistance to change that is entrenched within the construction industry. Continuous training and development of both managers and employees in the construction industry is necessary to keep them abreast with dynamics in the field supply chain management, and how these can be used to improve operations.

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