

SUPPLY CHAIN INTEGRATION BARRIERS IN CONSTRUCTION: VIEWS FROM TWO SOUTH AFRICAN PROJECTS

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The fragmented state of the construction industry is a global phenomenon visible in South African construction. The number of parties to a construction project has been on the upward trend in recent times. This increase in the number of members of a typical construction supply chain is invariably accompanied by an increase in management complexity. To counter the pitfalls of such complexities, the discipline has witnessed the proliferation of supply chain management (SCM) concepts of which integration is a notable aspect. Based on a succinct conceptual framework that was derived from the construction SCM literature, this paper reports on barriers to supply chain integration. A questionnaire was distributed among the participants of two South African projects. The responses indicate that lack of integration is partly responsible for performance-related failures in the form of rework and defects. Moreover, poor payment mechanisms between contractors, their subcontractors, and suppliers tend to work against nurturing long-term relationships on a project and business basis. The conclusion is that there is major scope for promoting a collaborative working approach between supply chain partners in South African construction.

Keywords: Construction Management, Contractors, Subcontractors, Suppliers, Supply Chain Management, South Africa.

1 INTRODUCTION

The construction industry is commonly understood as being unique in nature when compared to other industries (Egan 1998). Segerstedt and Olofsson (2009) suggest that the construction industry's attributes such as site production, one-off products, and temporary organization prevent the construction supply chain from being as efficient as the manufacturing supply chain.

Construction is renowned for rework, cost and schedule slippage, and other problems. The lack of efficiency in the construction supply chain is also regarded as a concern by Briscoe and Dainty (2005), who propose that there is no significant reason for the inefficiencies in the supply chain, since other industries have made great advancement in efficiency and integrated supply chains. The main reasons attributed to the inefficiency are the adversarial practices and poor supply-chain relationships between not only client and main contractor, but also main contractor and subcontractor/supplier.

Mistrust and the lack of goal-sharing are also common catalysts for the poor state of relationships. Best and De Valence (2002) discuss the complexity of construction supply chains, stating that on a specific project hundreds if not thousands of firms may be involved. Many supply chains are formed on a project-to-project basis, as the relationships may or may not pre-date a project; every project is different, and agreements are formed when necessary, depending on the project requirements and the capabilities of those involved. Thus many supply chains are configured to the demands of specific project requirements. According to Vrijhoef and Koskela (2000), the construction supply chain is characterized by a temporary supply chain, which consists of reconfigured project participants responsible for producing unique projects. Fragmentation, instability, and design-construction separation are direct results from the existence of temporary supply chains. These features have been examined and have led to calls for integration of the chain. This paper presents the findings of an exploratory study that assessed supply-chain integration in South Africa, with the aim of identifying barriers and suggesting ways to overcome them.

2 BARRIERS TO THE INTEGRATION OF SUPPLY CHAINS

The construction industry has been described as complex (Briscoe and Dainty 2005, Cox and Ireland 2002), as well as inefficient, wasteful, ineffective and underperforming. Fragmentation, adversarial relationships, project uniqueness, separation of design and production, and competitive tendering have contributed significantly to the status quo (Pryke 2009: 24). Thus, supply chain integration is regarded as a key component to effective supply chain management (SCM) because it should reduce costs, increase service levels, improve information sharing, facilitate communication in the form of consultation where necessary, and also assist decision making (Cheng *et al.*, 2010: 245, Lönngren *et al.* 2010). Morris and Pinto (2007: 239) describe several strategies which can be implemented to achieve supply chain integration, including the development of work clusters, collaboration, standardization and shared information network or protocol. However, certain barriers and/or complications prohibit this integration. According to Dainty *et al.* (2001: 170), Palaneeswaran *et al.* (2003: 201), and Ireland (2004), supply chain integration barriers include mistrust, fragmentation, adversarial practices, poor risks and benefits sharing, focus on price, opaque information exchange, lack of cooperative interactions, dominant power regimes, and failure of contractual obligations.

3 RESEARCH STRATEGY

Given that the exploratory study was intended to provide insights that will be useful for a future in-depth study, two projects within the Nelson Mandela Metropolitan area were selected. Multi organizational set-up of the projects was the criterion for their selection. The general contractors (GC) on each project provided a list of suppliers and subcontractors contributing to the project. Project 1 is a commercial building of 1800m² and Project 2 is a multi-level residential building of 225m². The sample size provided by the GC in Project 1 was 24, Project 2 was 13, and both sample sizes were inclusive of the GC's responses. A response rate of 37.5 % was achieved for Project 1, 53.8 % for Project 2, and an aggregate response rate of 43.2 %. This shows that a total number of 16 responses were analyzed from a possible 37. Descriptive analysis with

mean scores (MS) has been used to present the findings in the next section. Ten subcontractors, four suppliers and two principal GCs participated in the study. More than 18.8% of the firms have been involved in the industry for over 10 years and they have extensive experience with multi-organizational delivery of the projects in the industry.

4 FINDINGS AND DISCUSSION

When asked to rate the importance of managing supply chains in order to improve project performance, most of the respondents opined that SCM is very important, with the recorded MS at 4.50. Most notably, the study indicates that subcontractors and suppliers add value to the construction process as they assist to achieve quality, problem resolution, procurement of jobs, and improved profit margins (Table 1).

Table 1. Notable contributions of subcontractors and suppliers to project objectives.

Contribution	MS	Rank
Project value adding	4.50	1
Assist to achieve quality	4.38	2
Increase profit margins	4.06	3
Assist in problem resolution	4.00	4
Assist in procurement of jobs	4.00	5

In spite of these laudable perceptions, the factors indicated in Table 2 tend to negatively affect the relationship between partners in a supply chain in South African construction. Chief among the factors is the notoriously-cited “lowest price selection” of project actors in the industry. The MS of “lowest price selection” shows the extent of its impact on the supply chain. After “lowest price selection”, “tight schedule expectations” and “mistrust” were tied with the same MS. It is notable that “poor sharing of information” and “poor respect for people” within the project team influence the performance of the supply chain. The contributions of “poor activity coordination”, which may be exacerbated by “poor consultation”, impact on the supply chain negatively. In particular, 87.5% of the respondents contend that adversarial relations between project partners and fragmentation of the construction process affect the relationships in the supply chain. Almost all the respondents cited the impact of competitive tendering and the separation of design and site production in this context.

The respondents thus call for regulation collaboration (MS = 3.81) and long-term collaborative working relationships (MS = 3.88) that involve the same contracting partners in a supply chain. The type of existing relationship between contractors and their subcontractors and suppliers can be leveraged to improve collaboration in the supply chain. For example, the findings show that “reliance” (MS = 3.93), “hierarchy” (MS = 3.81), and “collaborative” (MS = 3.56) can be used to describe the type of relations among the contracting parties in Project A and B. It is notable that “independent relationship type” achieved the lowest rank, and thus was the lowest-valued consideration among the project parties.

Table 2. Factors negatively impacting relations within supply chains.

Factor	MS	Rank
Lowest price selection	4.56	1
Tight schedule expectations	3.88	2
Mistrust	3.88	3
Poor sharing of information	3.81	4
Poor respect for people	3.81	5
Poor activity coordination	3.75	6
Poor consultation	3.44	7
Traditional tender process	3.31	8
Technology	2.88	9

The abovementioned observations were also supported by the importance attached to the factors promoting efficiency in the supply chain of both projects. Table 3 shows that “communication”, “mutual trust”, “problem solving approach”, “goal sharing”, “collaboration”, “continuous improvement”, and “risk allocation”, have been individually and/or collectively used to ensure optimum project performance. The management in these two projects promoted these factors to avoid problems that always occurred due to non-collaborative tendencies within a project team. In fact, when the respondents were requested to rate such eventualities, the notable factors were conflicts, late project completion, variation orders, rework, and non-conformance to quality.

Table 3. Factors promoting efficiency in the supply chain of Project A and B.

Factor	MS	Rank
Communication	4.88	1
Mutual trust	4.63	2
Problem-solving approach	4.50	3
Goal sharing	4.44	4
Collaboration	4.38	5
Continuous improvement	4.19	6
Risk allocation	3.75	7

However, a focus upon quality appears within the management of the projects at the beginning of the works. The respondents were of the opinion that price was not elevated higher than other considerations when project parties were being appointed. This is particularly so when contractors have to appoint subcontractors and suppliers. Table 4 is a testimonial of the perceptions of the respondents in this regard. The MS, which ranged from 3.94 to 4.75, show that quality, trust, schedule, and reputation of a firm were valued more than price when appointing firms to the supply chain.

Table 4. Considerations relative to appointment of firms to the supply chain.

Factor	MS	Rank
Quality	4.75	1
Trust	4.69	2
Schedule	4.19	3
Reputation / Image	4.13	4
Price	3.94	5

To sum up, some respondents in the study offered general comments about SCM in South African construction. Three respondents commented as follows (*collated*): “Because subcontractors and suppliers cannot and/or should not finance projects, payments should be in weekly intervals. In addition, principal contractors should offer more professional assistance with bill pricing and details for the subcontractors. Time schedules should be agreed upon and respected. Not all principle contractors are unreasonable/unwilling to assist; Quality is always compromised because of price and the client who is the end user gets inferior items when price is given high consideration; and the relationship between suppliers and contractors has become increasingly important, developing into a value adding partnership built on communication and relationship. More emphasis should be placed on the relationship between supplier and contractor. The supplier should be more integrated into the construction process and should be seen as a ‘partner’ or as an extension of the construction company itself. The supplier needs to have the same vision as the contractor and needs to attend regular site meetings and updates on project progress and goals.”

5 CONCLUDING REMARKS

This study focused on construction supply chain integration barriers. The barriers outlined in the literature were further examined with two case projects. The respondents in the study indicated that suppliers and subcontractors contribute substantially to the success of construction projects in South Africa. Factors such as lowest price selection, unrealistic timeframe expectations and mistrust between actors become barriers to the integration of supply chain partners. This leads to commonplace adversarial relationships that encourage project partners to advantage themselves, which is detrimental to project success.

The study also supports the argument that price should not be the overriding reason for the appointment of project partners. Rather, quality, trust, and the reputation of the firm in terms of past project performance should, where possible, be rated higher than price. Approaching appointment decision in this manner would prevent and/or limit problems on projects. The barriers to integration should be addressed at the early stages of the project life cycle where optimum opportunity for added value for clients and the supply chain exist. An upstream decision that engenders collaboration and mutual trust should be promoted.

However, it is important to recognize the limitations of this study. Firstly, the perceptions are limited to only three members of a typical supply chain, and as such,

the findings may not be applicable when designers, financiers, and other stakeholders are included in such a study. Secondly, the findings cannot be generalized based on a small sample size and response rate. However, the insightful findings could be transferred to similar situations, especially in the region of South Africa.

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