

TOWARDS AN INTEGRATED CONSTRUCTION SUPPLY NETWORK: SUB-CONTRACTORS PERSPECTIVES

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Since the publication of the Egan report in 1998, there has been a strong emphasis on the need to integrate supply chains via partnering and strategic alliancing agreements throughout the construction industry. However, if the industry is to benefit from the performance enhancements that integrated supply networks promote, leading contractors must ensure that subcontractors buy into the supply chain management ethos, and work towards aligning their practices with the other partners involved. Historically, the relationships between main contractors and subcontractors have been adversarial. This raises questions as to whether true supply chain integration can take place. This paper presents the findings of research that examined the barriers to main contractors and subcontractors achieving total supply chain integration. By exploring subcontractor perspectives on supply chain management, and highlighting the fundamental issues which lead to mistrust and scepticism within supply chain relationships, the paper identifies a range of knowledge and attitudinal change requirements for improving the integration of these companies into the process in the future. It is suggested that main contractors must take the lead in promoting openness, trust and accountability if total supply chain integration is to be realised and change needs to be client driven to move any effect further down the chain.

Keywords: integration, sub-contractor, supply chain management.

INTRODUCTION

The construction industry has suffered from cost overruns, programme delays and poor productivity for a long period of time. To quote Keith Clarke, Chief Executive of Kvaerner (CITB, March 1999), "The construction industry in France and the UK makes 1% margins. In Korea and Japan it is bankrupt. We need to change or we will die." Examples of cost and time overruns are reported in the trade press on a regular basis. High profile projects, such as the Channel Tunnel and the Jubilee Line extension of the London Underground, have both suffered from such problems.

The industry's problems in this regard have been recognised by the government over recent years, and have led to the commissioning of the Latham (1994) and Egan (1998) reports. These have suggested mechanisms for change within the industry, and have set annual targets to reduce costs, time and defects within the industry. They suggest that these targets could be met by improving product development, improving project implementation, partnering the supply chain and by the standardisation of components. They suggest that construction should look towards other industries for solutions. Womack and Jones (1996) give examples of the automotive industry achieving similar goals. Other sectors include the aerospace industry, food manufacturing and the pharmaceutical industries (Inside UK Enterprise, 1999).

Latham (1994) underlined the reliance of the construction sector on competitive tendering for subcontracted work. It also drew attention to the adversarial attitudes that commonly exist between main contractors and their suppliers. The construction industry is characterised by one-off contracts and a failure to develop longer-term relationships between main contractors and key suppliers. The recent work of Thompson (1998) observed that the construction industry is hugely fragmented and involves supply chain pressures that militate against a simple single solution.

Supply chain management found its origins in physical distribution and transport, and has recently concentrated on closer relationships between parties involved in the flow of goods from the supplier to the end user. Relationships should extend beyond the exchange of materials or services for a price towards other services included within a package, to include design, distribution, marketing, knowledge exchange and specialist services (Levy et al, 1995). Supply chain theory indicates that value must be added to the process faster than cost (Lamming, 1996, Lockamy and Smith, 1997). Recent reports would suggest that this is probably often not the case for the construction industry, as cost overruns and low profits are both common place. The implementation of supply chain management principles may start to address such issues. Mechanisms vital to supply chain management include smooth information management, often by use of IT systems (Lamming, 1996). Some evidence exists to suggest that by increasing information-sharing, companies are witnessing greater openness and trust (Levy, et al, 1995).

Much research to date has concentrated on improving interactions between clients and main contractors, and in particular the formation of partnerships and strategic alliances. (Barlow et al, 1997, Crane et al, 1997, Himes, 1995, Bresnan and Marshall, 1998). However, researchers have largely ignored the influence of small subcontractors on the supply chain or they have chosen to concentrate on larger subcontractors (Building Down Barriers, 1999, Murray, 1998). Smaller companies continually contribute to the supply chain and for full integration, it is vital that their case is considered. Accordingly, this paper explores the relationships that exist between these smaller companies and main contractors to highlight the barriers that prevent the required integration. The aim of the research is to identify the skills, knowledge and attitudinal shortfalls, which act as a barrier to greater subcontractor involvement in the supply chain.

METHODOLOGY

It is important to begin with the players at the top of the supply chain when making improvements lower down (Alber and Walker, 1997). Accordingly, our research commenced by conducting semi-structured interviews with two large main contractors, who are involved in government initiatives to improve industry practices. The purpose of the interviews was to establish the level of commitment the companies had to the integration process and to determine the barriers they perceived to exist.

In the next step the research team used project documents to produce simple 'relationship maps'. These identified all subcontract linkages within a representative project where some form of interaction took place. From this information the research team identified the subcontractors that would be used for the research project. Subcontractors from both main contractors were selected to reflect companies of different size working in a variety of trades in the supply chain. A total of twenty-one subcontractors were interviewed. The subcontractor interviews were designed to

establish the knowledge the respondents had of supply chain management and other industry initiatives and to identify any potential barriers that existed to better supply chain integration. The interviews were semi-structured, allowing flexibility in the questions depending on the respondent’s knowledge of supply chain management. All interviews were conducted with managing directors or senior managers within the participating companies. The schedule of questions was developed from a range of literature such as Womack and Jones (1996) and also from issues that were raised in the preliminary interviews with the main contractors. The respondents were asked questions relating to supply chain management, relationships with main contractors, relationships with others in the supply chain, continuous improvement, partnering, as well as skills issues such as the most important skills they possessed, managerial and leadership skills and training issues.

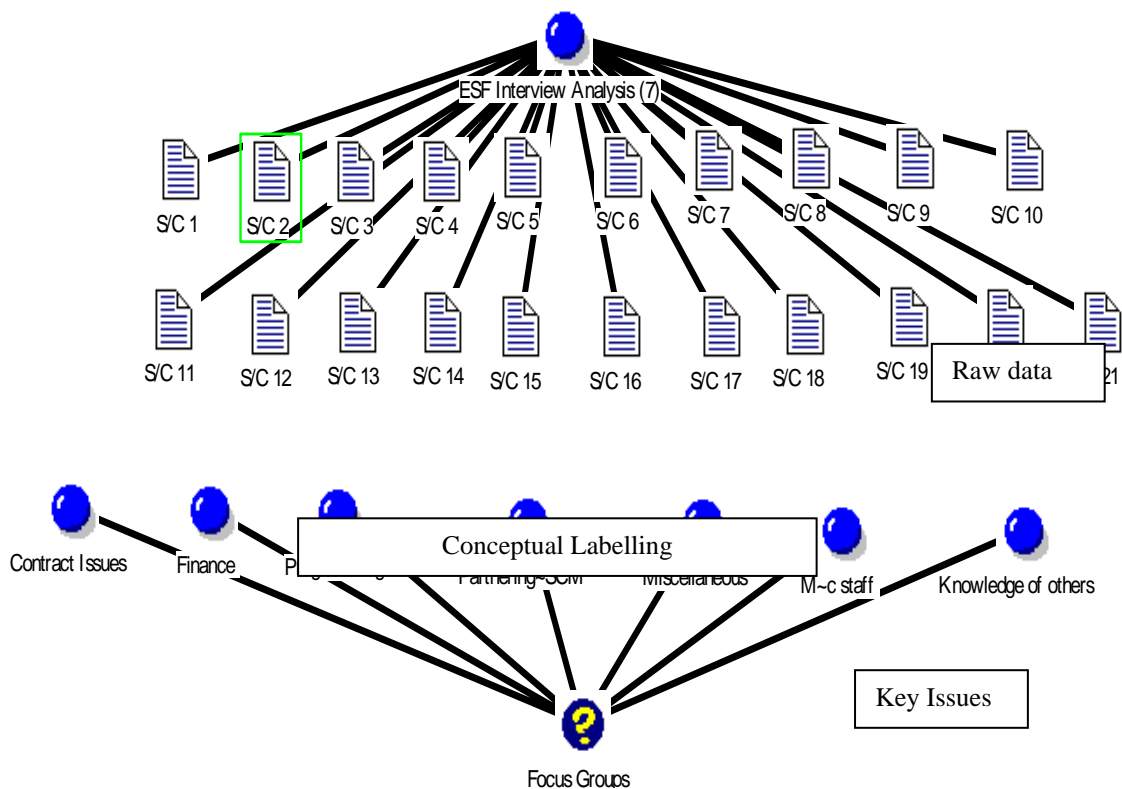


Figure 1: Project analysis using NUD*IST NVivo

The interviews were all recorded and transcribed verbatim. Once this activity was completed all of the transcripts were coded using qualitative analysis software NUDIST Nvivo. This software allowed sections of text to be coded under appropriate conceptual headings. Figure 1 illustrates how the raw data has been analysed, the top tier of the diagram illustrates the whole project and this is then broken down into the raw data at the second tier. Conceptual labelling then took place that could break down the raw data into key issues which are highlighted in the third tier of the diagram. Once the text had been coded the software was used to analyse the fundamental barriers to full supply chain integration.

The next stage of the research was to conduct focus groups with a variety of individuals from the construction industry including main contractors, subcontractors, academics and training organisations. The aim of these meetings was to compare perspectives of the participants with regards to the issues raised, to develop mutually

acceptable solutions to overcome supply chain barriers and to determine any necessary training, skills or development requirements. The meetings were conducted in a relatively informal manner to engender a relaxed environment to encourage open discussions. The meetings were recorded, transcribed and subjected to further analysis using NUDIST NVivo. The results of all three aspects of the work are presented below.

RESULTS

Main contractor perspectives

The two main contractors involved in the research were both operating on a variety of complex building and civil engineering projects in the UK and one of the companies regularly carried out work overseas. Interviews were held with a number of key personnel within these companies at both an operational and strategic level. The level of commitment to supply chain integration was demonstrated by the fact that both companies had charged directors with “championing the cause” of supply chain management (Crane et al, 1997). One of the companies held weekly meetings attended by a cross section of departments to discuss progress. Topics discussed included the interaction of different departments, education of the workforce to the benefits of supply chain management, problems that arose due to the implementation of supply chain practices and financial issues.

It was apparent in both organisations that the level of commitment demonstrated by strategic management was not reciprocated at the operational level. All employees who were formally questioned about supply chain management responded in a manner that indicated they were committed to implementing such new practices. However, when questioned outside of the research context, it became apparent that a large number were just paying lip service to the new practices that the organisations were trying to adopt. For example, quantity surveyors were still dedicating a lot of time playing subcontractors off each other, to try and get prices lowered. This was even evident where certain subcontractors had been part of the project since the tender stage and had been involved in design aspects.

This stage of the research also indicated that a certain amount of misunderstanding existed between what senior management believed they were doing and what actually happened. For example, both organisations claimed to be reducing the importance of price in the selection of subcontractors and suppliers. However, both organisations continued to emphasise price throughout the interviews and meetings as a key determinant of subcontractor selection.

Both organisations claimed to be committed to supply chain management and both claimed to have successfully partnered with clients. Partnering relationships with the clients were not explored in this research. However, further enquiry may suggest that these partnering relationships are not in the true spirit of supply chain management. This is evident from the emphasis that has been placed on price rather than value. Supply chain management theory indicates that value must be added to the process faster than cost (Lamming, 1996). The literature also suggests that the faster cash flows through the chain, the healthier the supply chain actually is (Alber and Walker, 1997). This is obviously not usually the case in the companies interviewed.

Subcontractor views

The interviewees answered questions relating to their own companies as to how they interacted with other members of the supply chain. It is important to note that although the subcontractors interviewed often worked for the collaborating main contractors, comments made during the course of the interviews were general and not specific to any particular main contractor. Once the interviews were analysed the perceived barriers to integration were presented under common themes relating to key linkages in the supply chain.

Financial issues

Financial problems seemed to be an important issue to the subcontractors. Countless incidents of late payments or having monies withheld meant that the interviewees sometimes had little faith in main contractors. They generally thought that main contractors needed to address this issue first, before subcontractors were willing to implement supply chain management partnering. Subcontractors, who had been established in the industry for many years, discussed their ability to be selective over which main contractors they priced work for. They usually based tenders on their previous experience of working for that particular contractor. Thus, where main contractors treat subcontractors inappropriately, it is likely that they will not get the best value in the future. Even where contractors claimed to be working in partnering relationships, there was still evidence of incorrect and late payments.

A second financial issue that inhibited improved working relationships was the tendering process. Despite reassurances from clients and main contractors that they considered criteria other than cost, very little evidence of this was apparent. Main contractors were criticised for accepting the cheapest price for work despite the fact that they were sometimes aware of pricing errors in the tender. Such errors may result in bankruptcy for the subcontractor. Subcontractors also talked of being put under pressure to reduce their prices, and they said that this hindered the developments of relationships between the two companies.

A third obstacle for subcontractors was the withholding of retention monies. They continually struggled to retrieve monies from main contractors, despite there being no defects to put right. Most subcontractors generally thought that the amount of monies withheld by main contractors was not enough of an incentive in itself to put right any defects. Most said that they would return anyway and put the works right. This lack of trust on the part of the main contractor was seen as a major handicap to further supply chain integration.

Open book accounting was discussed with the subcontractors, some of whom had already practised it with smaller main contractors and industrial clients, where partnering relationships already existed. They did not seem to have a problem using it in these situations. However, those subcontractors that had no past experience of open book accounting thought that it would be used by main contractors as another excuse to drive down their overheads and profits.

Programming

The responding subcontractors generally thought that programme times were frequently unrealistic. However, they conceded that these were constraints imposed by the client. It was thought that their involvement in projects could be earlier, if it was not for delays in the procurement process. It was felt that main contractors spent too much time conducting "Dutch Auctions" with the subcontractors, time which could be spent more constructively by the subcontractors preparing for the project and

being involved with value engineering and buildability exercises. Another complaint was that subcontractors often arrived on site at the request of the site team, only to find that the project was not necessarily ready for their particular trade. This communication problem resulted in abortive work for the subcontractor and led to losses that needed to be recovered elsewhere, inevitably in the main contractor's next tender.

Contractual issues

Traditional contracts between main contractors and subcontractors were seen as biased towards the main contractor and as encouraging bad practices. For example, JCT 98 encourages retention monies to be withheld. Subcontractors did not generally consider reliance upon a legal contract to be very productive and believe that claims against main contractors soured relationships and as a result tended to avoid them.

Main contractor's staff

Of all the staff employed by the main contractors, the quantity surveyors received the most severe criticism. The subcontractors generally had a low opinion of QSs and many accused them of not being involved in projects early enough and not considering price as the most important criteria. It was thought that they needed to improve communication skills with the subcontractors.

Subcontractors thought that estimators needed a better understanding of how their businesses operated. The respondents receive many different enquiries in any one day, thereby placing severe demands on their business. The estimators expect these submissions to be priced immediately. This may be slightly more realistic for some of the larger subcontractors but the owner/manager is likely to have other, more pressing problems to resolve before he can price any more work.

It was thought that site management should be responsible for determining the smooth progress of the contract and effectively co-ordinating the trades, if they are to work better together. Good relationships between the subcontractor and main contractor were said to rely upon the management skills of the main contractor from the managing director down. It also depends on a consistent approach from all those within the organisation. However, discrepancies in approach were found to exist between the procurement and operational teams, suggesting that company policy was not being translated at a project level.

Knowledge and information

The majority of subcontractors thought that they needed a better understanding of the main contractor's business, and vice versa. However, they thought that main contractors did not want to know about their businesses or were worried that if the main contractor knew too much, they would demand that prices were reduced. Traditional tendering processes hindered knowledge exchange between companies, but partnering relationships were enabling companies to start to understand others in the supply chain and to provide better information.

Partnering/Supply chain management perceptions

For subcontractors that were interviewed for this research project experiences of partnering and supply chain management were mixed. It was felt that some main contractors did not understand the principles of partnering and that they were partnering for the wrong reasons. For example, they were partnering because the client wanted to work in such a relationship and, therefore, they would only win the work if they were partnering with their subcontractors. However, it was noted that a particular subcontractor had an excellent partnering relationship with a particular

repeat client who practised supply chain management in their primary business function.

Those with partnering experience thought that these relationships were better than traditional contracts as they promoted openness and reduced programme times. They also thought that partnering reduced the need to be contractual. However, there was some disillusionment of partnering, as there was commonly no early introduction to the project and some of the payment issues still remained. None of the subcontractors interviewed had experienced long term partnering arrangements, but they were aware of the benefits, as they would be able to plan future business more effectively.

Respondents thought that if they were to enter into partnering relationships, the likelihood would be that they would be more involved in design work and would therefore need extra skills in this area. They would also need to be aware of legislation and costing, if they were to be involved in value engineering exercises.

Miscellaneous issues

In general, subcontractors were highly selective about which main contractors they wanted to work with. Main contractors that took an interest in the financial position of the subcontractor were preferred, as that was an obvious indication of a commitment to establishing long term relationships.

Subcontractors said that where good relationships existed, problems were alleviated more effectively and they were able to provide a more efficient service. However, where these relationships were weak, main contractors were accused of not considering the subcontractor's problems. It was believed that the attitude of some main contractors needed to change. Subcontractors were rarely praised for good work and frequently main contractors adopted arrogant and superior attitude towards them.

Focus group confirmation

The research findings gleaned from the interview stage of the research were discussed at a focus group attended by a variety of personnel from the construction industry. The research team presented the interview results to the group and then invited discussions. The discussions of the group reflected the importance of the issues raised at the interview stage and validated the earlier findings.

Of particular importance to the subcontractors in the group was the issue of payment. The lack of trust between subcontractors and main contractors was identified as a barrier to subcontractor's integration into the construction supply chain.

Subcontractors felt that this issue could not be addressed until main contractors started to treat them in a fair manner, with particular regard to correct payment. It was also noted that subcontractors and suppliers were often SMEs and as a result often put their family homes in jeopardy for the benefit of the business. Main contractors need to appreciate that these companies do not have the financial status of larger companies working in the industry.

Other issues raised during the course of the meeting included information transfer, a greater knowledge of supply chain businesses and the formation of better relationships between parties. It was concluded that almost all of the barriers that were discussed at the meeting were attributed to some form of communication problem. Training providers present at the focus group highlighted a gap in all levels of construction training regarding communications. If individuals in the industry start to communicate more effectively, i.e. receiving as well as giving information then they will be able to start to understand other organisations in the supply chain. If they can understand

these other organisations they may be able to sympathise with their needs and subcontractors will be a step closer to supply chain integration. This may require new skills in areas of management and IT that are not common in UK construction.

Table 1: Barriers to supply chain integration for subcontractors and possible solutions

| Key Issues | Barrier to subcontractor integration into the supply chain | Change required to alleviate barrier |
|---------------------------|--|---|
| Financial | Late and incorrect payments; Tendering process; Retention; | Main contractor's need to pay fairly; Main contractors need to concentrate on value rather than price; Trust needs to exist between parties; |
| Programming | Unrealistic programme times; | Parties should be involved in construction projects earlier; |
| Contractual | Traditional contracts do not engender good working relationships; | New contractual documents or less reliance on contracts; |
| Main Contractor's Staff | Qs do not encourage subcontract integration; Estimators are too demanding on small organisations; | QS training in communication skills; Educate estimators into the demands of these businesses; |
| Knowledge and Information | Companies do not understand other businesses within the supply chain; | Time needs to be taken to learn from partner organisations; |
| Partnering | Some partnering relationships are executed for the wrong reasons; Many partnering relationships were one sided; Some subcontractors lack skills relating to design, legislation and costing that may be required for partnering; | All employees should be educated in the benefits of partnering; Main contractors need to offer subcontractors benefits if they are to enter into such relationships; Subcontractor training for those lacking skills; |
| Miscellaneous | Main contractors do not treat subcontractors fairly; | Educate main contractors into the business needs of smaller organisations. |

CONCLUSIONS AND FUTURE WORK

This pilot study has highlighted barriers to supply chain integration by smaller subcontractors and suppliers and has concentrated on main contractor and subcontractor relationships. Discussions took place at the focus group relating to the influence of the client on the project and in particular the fact that the SME integration into the supply chain was often influenced by the client's approach to construction procurement. Clients that practised supply chain principles in their primary business function were considered to be better prepared to procure construction in a way that integrated companies into the process. This was also illustrated at the interview stage where one particular subcontractor had an excellent partnering arrangement with a client. This client was a national supermarket chain that practised supply chain management in their primary business function.

The research also supported Alber and Walker, (1997) in that change needs to come from organisations with the most power, i.e. the company who desires the product in

the first place, in the case of construction, the client. The subcontractors gave some sympathy to the main contractor because they recognised that some of the barriers that prevented them from being integrated into the supply chain stemmed from problems that the main contractors inherited from the clients. For example payment delays were often due to the main contractors not being paid on time by the clients.

These findings have led the research team to consider the impact that the client has on the procurement of the construction project, in particular, does the way in which the client carries out procurement for his primary business function have an influence on the way they procure construction projects? Therefore, the next stage of the research will conduct a series of case studies to identify the relationship between the client's primary business function and the way its construction projects are procured. The focus will be on whether the subcontractors and suppliers at the second tier of the supply chain can be integrated to a greater extent, when construction procurement is not influenced by a client's primary business function.

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