Thesis for the degree of Licentiate of Engineering

Contractor-Supplier Relations in a Large Contractor Organisation

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To enjoy, one must love
To love, one must understand
To understand, one must know
To know, one must learn.

Zino Davidoff

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Abstract

Even though contractors purchase over 70 percent of their turnover from suppliers, both the construction industry and construction research ignore the contractor-supplier relations. In order to realise the potential related to development of contractor-supplier relations, the aim of this thesis is to explore and increase understanding of the relationship between contractor and supplier. The findings are based on a two-year case study of a large Swedish contractor, where field observations and in-depth interviews with individuals at the purchasing department, the production management and within a supplier's organisation have been carried out and have been complemented by group discussions and review of documents.

The results show that there is high uncertainty in the demand from the contractor, which leads to highly flexible solutions from the suppliers. This flexibility is costly. In order to change this situation, relationship enablers, such as total cost focus, aligned core values and willingness and capability to collaborate, need to be committed by both parties. This must be grounded in a long-term thinking. However, several perceived constraints have been identified. These relate mainly to the contractors organisation and behaviour and also to the large diversity in the supplier market in construction.

To conclude, three recommendations for major contractors are presented: they need to concretise and visualise their relationships with suppliers, they need to build a united interface towards the suppliers and they need to dare to commit long-term. Contractors who take on these recommendations will gain valuable competitive advantages.

Keywords: contractor-supplier relations, supplier relationship management, construction industry, case study

Appended papers

This thesis is based on the following papers:

Paper I

Frödell, M. & Josephson, P.-E. (2008) Initiating Supplier Development through Value Stream Analysis: The Case of Skanska Sweden and its Largest Supplier. *Proceedings of CIB W65/55 Commissions: Transformation through Construction.* Dubaï, UAE.

Paper II

Frödell, M. (2009) Criteria for achieving efficient contractor-supplier relations in the construction industry. S*ubmitted to Journal for review.*

Paper III

Frödell, M. & Josephson, P.-E. (2009) Perceived Constraints when Establishing and Maintaining Contractor-Supplier Relations in Construction. *Working paper, Construction Management, Chalmers University of Technology*.

Additional publications

Journal publication

Frödell, M., Josephson, P.-E. & Lindahl, G. (2008) Swedish construction clients' views on project success and measuring performance. *Journal of Engineering, Design and Technology,* 6 (1), 21-32.

Conference papers

Josephson, P.-E., Frödell, M., Karlsson, A. & Lindström, J. (2006) Measuring performance within Swedish construction project organizations: learnings from other tools. *Proceedings of CRIOCM 2006 International Research Symposium on Advancement of Construction Management and Real Estate.* Beijing, China.

Josephson, P.-E., Lindström, J. & Frödell, M. (2006) Challenges when developing tools for measuring construction excellence: a Swedish case. *Construction in the XXI Century: Local and global challenges, Symposium Proceedings.* Rome, Italy.

Josephson, P.-E., Polesie, P. & Frödell, M. (2009) Understanding resources waste reduction priorities in Swedish construction. *Proceedings of CIB Joint International Symposium 2009: Construction Facing Worldwide Challenges.* Dubrovnik, Croatia.

Polesie, P., Frödell, M. & Josephson, P.-E. (2009) Implementing standardisation in medium-sized construction firms: facilitating site managers feeling of freedom through bottom-up approach. *Proceedings for the 17th Annual Conference of the International Group for Lean Construction.* Taiwan.

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Thanks to all my former colleagues at Skanska for fruitful discussions and for two really enjoyable years. I would also like to thank Andrea Pap de Pestény and Ulrika Schleimann-Jensen for managing the supplier development project at Skanska. This opportunity to be a part of the studied organisation has hopefully given this thesis a genuine impression, reflecting my experiences.

At the time when I was to leave Skanska for new research adventures, major organisational and personnel changes were about to happen within the purchasing organisation. This is, however, not discussed nor considered in this thesis, even though the new transformation and the following effects would have been an interesting research area in itself. Nevertheless, I wish all of you the best of luck.

I would also like to thank Formas-BIC, SBUF and CMB for funding my research project.

Last but not least, I would like to thank my family and friends for their company and support, and Madelene, thank you for love and laughter.

Göteborg, December 2009

Mikael Frödell

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1 Introduction

When I participated in the construction conference hosted by the International Council for Research and Innovation in Building and Construction, CIB, in November 2008, it struck me that relationship thinking was a much discussed topic. Unfortunately, as Akintoye et al. (2000) and Saad et al. (2002) already accentuated in the beginning of the decade, the focus was mainly on the relationship between contractor and client. Only my own contribution, (Frödell and Josephson, 2008), concerned the relationship between contractor and supplier. This lack is surprising since contractors typically purchase around 70-80 percent of their turnover from suppliers, and suppliers therefore have at least as large impact on the quality, cost and time of the contractors' projects.

Table 1. Estimated effects of supplier development. Adapted from (Krause, 1997, p.16)

Criteria	*Before supplier development*	*After implementation*
1. Incoming defects	11.65%	5.45%
2. Percent on-time delivery	79.85%	91.02%
3. Cycle time	35.74 days	23.44 days
4. Percent orders received complete	85.47%	93.33%

The importance of suppliers and the potential gains in development of the relations towards them has however been studied for a couple of decades (e.g. Kraljic, 1983; Hines, 1994; Dyer et al., 1998). Even though these studies were mainly conducted within the manufacturing industry, the tendencies are clear. Krause (1997) conducted a survey amongst 527 purchasing executives in the US, asking them to estimate the effects on their organisation of implementing supplier development. Examples of supplier development were feedback to suppliers, site visits and formal evaluations of supplier performance, and the results were astonishing, see Table 1. Incoming defects decreased by more than 50 percent; late deliveries decreased by more than 50 percent; incomplete orders decreased by more than 50 percent, and still the construction industry is ignoring the importance of suppliers or at least the possibility of improving their activities and the interface towards them. Positive effects on purchasing performance including quality of purchased goods, on-time delivery and actual versus target cost of material have been shown in a study of 306 purchasing

managers in Spanish manufacturing companies (Sánchez-Rodríguez et al., 2005). Furthermore, Carr and Pearson (1999) showed, through a cross-industry study of 571 purchasing directors and vice presidents, that long-term relations with key suppliers influence the buying organisations financial performance positively. However, the conditions within the construction industry may be considered different to the ones in the literature (see Paper III) making findings from studies in other industries difficult to directly transfer into the construction industry (Errasti et al., 2007).

Meanwhile, in Sweden the development of the construction industry has been questioned by both government and the concurrent construction management research. Governmental investigations have pointed out the need for increased productivity and quality (Byggkommissionen, 2002) while results of research suggests that the costs related to construction could be cut by as much as one-third within a ten-year period if non-value adding processes and activities were eliminated (Josephson and Saukkoriipi, 2005). Due to these findings, pressure on Swedish contractors has increased during recent years. Contractors have begun to devise new strategies for increased productivity and decreased total costs, including issues related to customer-relations, industrialisation and lately to purchasing (Axelsson, 2005), even though the effects might yet be difficult to discern.

Recently, Josephson and Saukkoriipi (2009) presented 31 recommendations for increasing productivity in construction. These recommendations include striving for long-term customer-supplier relations and supporting main suppliers in their development. A study of Swedish contractors' perception of the implementation of the 31 recommendations within their organisations showed that striving for long-term customer-supplier relations was perceived to be among the top three recommendations, while supporting main suppliers in their development was perceived to be among the bottom three recommendations (Josephson et al., 2009). This implies that even though contractor organisations are generally striving for long-term relationships with other actors in the industry, particularly clients, they have not yet realised the potential gains involved in long-term contractor-supplier relations and development of these relations.

1.1 Research aim and scope

In order to realise the potential related to development of contractor-supplier relations, the aim of this thesis is to explore and increase understanding of the relationship between contractor and supplier.

To fulfil the aim of this thesis and bridging the gap in the construction relationship research, case studies have been conducted investigating relationships between a major Swedish contractor, Skanska Sweden, and its framework agreement suppliers. A three-phase approach, illustrated in Figure 1, has been used to illuminate different perspectives of the relationship where the phases correspond to the research questions which form the basis for this thesis.

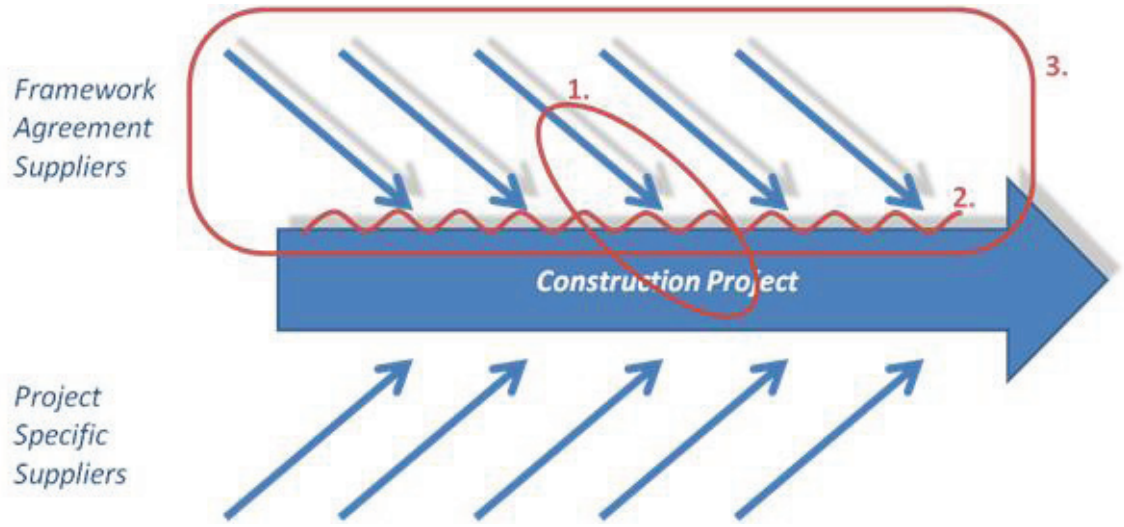

Figure 1. The three-phase research scope

In phase 1, a specific relationship between one contractor and one supplier has been examined in order to answer the first research question:

> *RQ 1) What are the strengths and weaknesses in the interface between major contractors and their largest suppliers?*

In phase 2, a broader scope has been taken by investigating generic relationships between the contractor and the framework agreement suppliers, addressing the second research question:

> *RQ 2) What are the main criteria for efficient buyer-supplier relations related to the characteristics of the construction industry and large contractors?*

In phase 3, a holistic perspective has been attempted by discussing and reflecting on the contractor-supplier relations and its place in the construction industry in order to elucidate the third research question:

RQ 3) What are the perceived constraints when establishing and maintaining contractor-supplier relations in the construction industry?

In addition to being a part of this thesis, each research question has individually been answered in the appended papers.

1.2 Purchasing at Skanska Sweden

Skanska Sweden is a major contractor in the Swedish construction industry and is one of nine business units of Skanska AB, which had a turnover of SEK 143.7 billion in 2008. Skanska Sweden's contribution to the parent company's turnover was SEK 30.3 billion and it had 12,000 employees. Skanska Sweden is active within civil engineering and building construction and is annually involved in approximately 3,500 projects located all over Sweden. Its vision is to become a role model for Swedish industry, but as a first aim it strives be the most professionally outstanding construction company in Sweden, not only competing with other major national contractors such as NCC and Peab, but also with regional contractors.

In this thesis, the case study company is Skanska Sweden (hereinafter referred to as Skanska), where I have been employed as an industrial PhD during the study period 2007-2009. Within the company, purchasing has played an increasingly important role during the last 5 years. In the autumn of 2004 a development project was initiated from the management with the mission to form a proposal for the transformation of purchasing within Skanska. The aim of this initiative was to fully utilise the potential benefits Skanska could gain from being one of Sweden's major internationally active companies.

Historically, purchasing has been a decentralised activity with the responsibility given to each project and involved approximately 2,000 of the 10,700 employees during 2005. Each individual depended on its own network with suppliers, using the one it found most attractive or suitable. As a result, purchasing within Skanska has been very fragmented, not only in terms of the many different suppliers used, but also in terms of those suppliers treating buyers from each individual project separately. Rebates and discounts from the specific supplier have consequently varied vastly within the company and a holistic picture of the company's purchasing patterns has been lacking. In turn, many suppliers have been missing the picture of Skanska as one customer.

In 2006, the purchasing transformation began and between 2006 and 2008 Skanska's purchasing department grew from 30 to approximately 120

employees, recruited both internally and externally. For instance, recruits have come from companies such as Accenture, Astra Zeneca, Ericsson, General Motors and IBM as well as from among new graduates. The purchasing department centres on category managers who are responsible for sourcing and management of the supplier base in one or more purchasing categories. The category managers themselves do not actually buy, but represent the suppliers' formal contacts with Skanska at a strategic level. Purchases are performed at the operational level of the organisation. A handful of category managers of related categories constitute a purchasing group, which is managed by the purchasing group manager. The purchasing group manager coordinates the group and is responsible for the fulfilment of goals and objectives, where each group deals with categories related to either material or services. Alongside these obligations, the purchasing group manager also has the role of category manager for one or two categories. In addition to the strategic purchasers there are three other functions in the purchasing department to act as specialist support to the strategic purchasers with sourcing, implementing suppliers and providing advice on international matters.

1.2.1 Consolidating volumes

During the first couple of years, the purchasing transformation focused on coordination of purchasing volumes and decreasing purchasing costs. There was also a concerted effort to source new agreements and to implement a new interactive procurement portal.

Purchases within Skanska Sweden are divided into project specific purchases and coordinated purchases. Project specific means that sourcing is conducted for each individual project, and thereby the suppliers are continuously exposed to competition. Coordinated purchases are built on framework agreements between suppliers and either Skanska AB or Skanska Sweden. The first goal of the purchasing transformation was to strive towards increasing the total percentage of coordinated purchases.

In 2004, only 20 percent of the total purchasing volumes were coordinated and the aim was to increase the amount to 50 percent by 2008. Of the total purchased volume during 2007, coordinated purchasing accounted for 30 percent from approximately 600 suppliers who had signed a framework agreement with Skanska. 71.5% of Skanska Sweden's turnover consisted of purchasing costs during 2007. The supplier base, however, remains fragmented. As can be seen from Figure 2, the total supplier base of Skanska Sweden consisted of 28,000 suppliers in 2007, of which 5.06% represented 80.0% of

total expenditure. A number of smaller specialised suppliers are also needed in order to meet customer requirements and to compensate for the geographical limitation of several service suppliers. However, with a total of more than 2.5 suppliers per employee, there would most likely be a possibility to decrease the supplier base without negative effects on the company's performance. A deeper discussion of the issues concerning the complexity of the contractor's organisation can be found in Paper III.

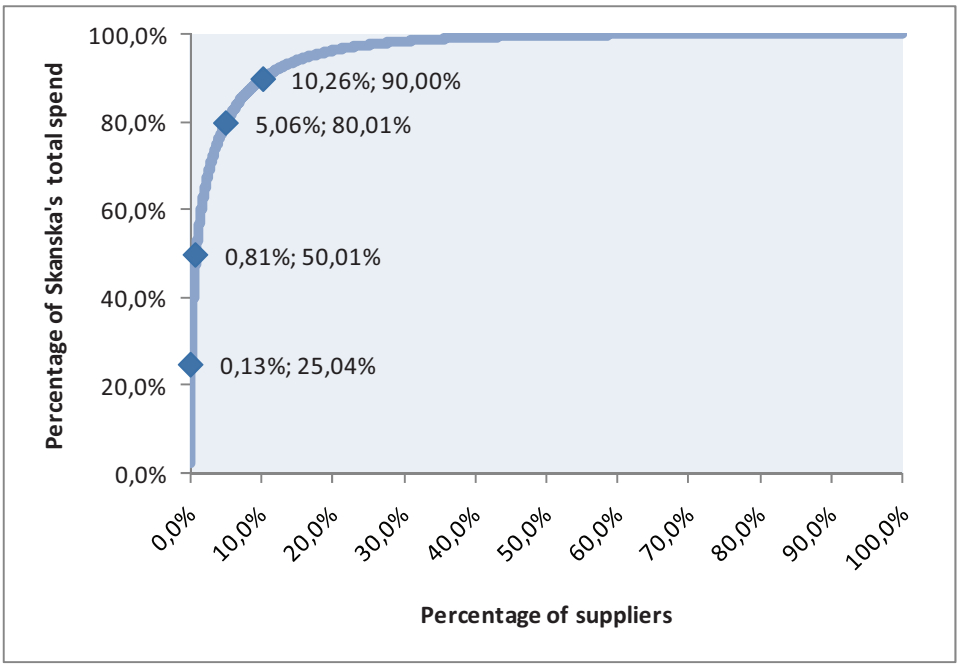

Figure 2. Percentage of Skanska's suppliers representing part of total spending

While the purchasing function is transforming from an administrative project-based activity to a specialized strategic function, some performance metrics such as loyalty to agreements and payments to suppliers, have been established while other essential metrics have been omitted. The current approach at Skanska Sweden is, however, focused on measuring what is possible to measure, rather than to measure what the organisation actually needs. For instance, there is no certain way to measure delivery precision, which instead is evaluated by conducting a survey of the construction project after the deal with a supplier has been completed. Furthermore, the company has no established procedure for following up and measuring complaints even though there are strong opinions from within the organisation that these two

measures need to be in place before developing evaluation methodologies and supplier surveys.

Despite the lack of some essential metrics, several sources for facts and evaluations are in place. Continuous monitoring of how much of the purchased products is related to the agreements and how much is not, is connected to the interactive procurement portal. Furthermore, the portal monitors what is purchased through the interactive portal and what is bought by phone or over the desk. Since some metrics are in place, in 2008 the management of Skanska decided to start developing and implementing a Business Intelligence system in which all relevant information could be easily found.

1.2.2 Managing supplier relations

In late 2006, a project focusing on supplier development was initiated by the purchasing department. The project was inspired by Djurback et al. (2006), who recommended a method to categorise and evaluate framework agreement suppliers. At this time, Skanska had few standardised methods for handling relations with the framework agreement suppliers. Since there was a need to follow-up with suppliers, the strategic purchasers within the purchasing department used methods from their former experiences which resulted in a fragmented and non-standardised approach towards suppliers. The aim of the supplier development project was to develop tools and processes to evaluate, follow up and further develop the supplier relationships with the framework agreement suppliers. The industrial PhD project, on which this thesis is based, was part of the supplier development project.

The first part of the supplier development project was to find a segmentation method for the suppliers in order to direct supplier development efforts in the most effective way. The second part involved the development of evaluation methods for measuring the operative and strategic performances of suppliers. The operative evaluations were to be used for both framework agreement suppliers as well as for project specific suppliers which delivered over a certain amount of money. The strategic evaluations were to be used with the framework agreement suppliers segmented as having a superior impact on Skanska's performance. The intention of the framework agreement supplier evaluations was that they should be mutual, where the supplier also evaluated Skanska's performance in the contractor-supplier relationship. During the development of the strategic evaluations, a study of criteria enabling efficient contractor-supplier relations was conducted, details of which can be found in Paper II.

In the final part of the supplier development project, methods and tools for developing the suppliers were constructed and a major sub-study of the largest framework agreement supplier, an internal supplier of rental construction equipment and machinery, began. What started as supplier development turned out to be relationship development since it became evident that Skanska – the buyer – needed to improve at least as much as the supplier. This sub-study was welcomed as much by the strategic purchasers as it was by the supplier. At the conclusion of the industrial PhD project, a new agreement was written between the parties and many of the issues and recommendations from the study were included. A map of the relationship and some of the strengths and weaknesses can be found in Paper I.

At the time when the supplier development project and the two-year case study were completed, the developed methods and tools had not been fully implemented. Therefore the effects were difficult to evaluate and it was also unclear whether the project contributed to a less fragmented approach towards suppliers. Many constraints were encountered that had not initially been considered, not only in the purchasing division but also in other parts of the organisation. To elucidate some of these perceived constraints a discussion paper was written, Paper III. This paper visualises parts of the situation encountered when working with contractor-supplier relations in the construction industry.

2 Frame of reference

In order to review current knowledge, a brief overview of the state-of-the-art is presented below. Initially, the literature on construction supply chain is summarised after which the buyer-supplier relations literature is presented. Finally, an overview of the literature of process development is briefly presented.

2.1 Construction supply chain

Construction is generally seen as an industry producing one-off projects where repetitiveness is minimal. Several initiatives have been taken in order to increase efficiency, effectiveness and productivity in the supply chain aiming at integration of design and production (Love et al., 2004), investigating the relationship between the client and its suppliers (Cox and Thompson, 1997) and the relationship between the construction site and the supply chain (Vrijhoef and Koskela, 2000). Furthermore, Akintoye and Main (2007) investigated the UK contractors' perceptions of relationships in general in construction and showed that these relations most often are customer driven and that there is little consideration of suppliers and subcontractors in these relations.

Even though supply chain management within construction in many cases is synonymous with partnering (Fernie and Thorpe, 2007), supply chains downstream from the contractors should be targeted in order to effectively reduce the overall construction cost (Proverbs and Holt, 2000). Accordingly, Dainty et al. (2001) address contractors' need to make efforts in building partnerships and long-term relations not only with clients but also suppliers, even though these organisations might be smaller than the contractors' organisations. However, the integration and establishment of long-term relations with these small and medium sized companies may not be easy, and several barriers have been identified. One of the main barriers seems to be that the suppliers perceive the relationship initiatives as enhancing the contractor's profitability at the expense of the suppliers.

The interactions between contractor and supplier required at the construction site are a foundation for learnings and mutual experiences, which should be taken care of by building relationships with a duration longer than a single project (Dubois and Gadde, 2000). Even though the contractors have the ability to realise the accompanying benefits if they were able to achieve a more regular workflow, the collaborative relationships remain small within

construction (Green et al., 2005). Long-term relationships are not the general solution to all problems within construction, but rather the relations should be adapted to the context (Fernie and Thorpe, 2007). Green et al. (2005) articulate that few of the papers within construction research include context in the comparisons with other industries, while pointing out that power relations between companies and also market conditions might interfere. Nevertheless, Errasti et al. (2007) indicate that significant improvements may be possible if contractors concentrate their purchasing to fewer suppliers and work more closely with their suppliers. In a study of 448 contractor-supplier relations, Kamann et al. (2006) show that historical collaboration and expected future collaboration lead to higher efficiency and better results in the relationship; however, they saw a stronger link if the relationships are individual rather than organisational.

2.2 Buyer-supplier relations

While Dubois and Gadde (2000) strive for an understanding of the supply network, analysis of supply chain interaction should be done at a dyadic level (Bäckstrand, 2007). The focus of this thesis is on the dyadic relationship between the buyer – in this case the contractor – and the supplier.

Gadde and Snehota (2000) state that no general best type of relationship exists and that prerequisites and context play a major role in relationship decisions. They pointed out that the degree of involvement in a relationship should never be a permanent decision but should be reconsidered as conditions change. In a seminal article, Krajlic (1983) divided a firm's purchases into four categories based on two dimensions: the importance of the purchase and the complexity of the supply market. The four categories range from noncritical, leverage, bottleneck to strategic as the two dimensions increase. Long-term relations are most interesting for a buying firm if the supplier is categorized as strategic according to Krajlic. The purchased product also needs to be of high volume and of critical nature (Monczka et al., 2009).

Studies of buyer-supplier relations often have the perspective of the buyer. Several criteria have been pointed at as essential in order to build sustainable relations, such as trust and coordination, commitment, effective communication, top management commitment and expectation of relationship continuity (e.g. Ellram, 1995; Monczka et al., 1998; Krause, 1999). Based on their survey of 141 buyer-supplier practitioners, Ryu et al. (2009) argued for a division of these criteria into a strategic and operational level, where the strategic level, such as strategic fit and interdependence affects commitment and

the operational level, such as operational compatibility and communication affects trust. Furthermore, both commitment and trust affect the collaboration between the parties, which in turn contributes to better supply chain performance.

Krause (1999) claimed that the buying organisation would like to see some evidence of the supplier's commitment to the buying organisation and the relationship, and that the supplier's commitment may be fostered through the buying organisation's engagement in the supplier's problems. If the buyer is treating these problems as a matter of internal concern, the supplier may be encouraged to commit to a long-term perspective of the relationship and the buying organisation. Attraction between the parties is also needed during the entire lifespan of the relationship and is argued to be a way of increasing the added value of the buyer-supplier relationship (Ellegaard and Ritter, 2006). Attractiveness implies that the customer creates interest from the supplier leading to benefits such as greater commitment to the customer (Ellegaard et al., 2003).

Trust, friendliness and co-operative features of long-term relationships will, however, not guarantee greater satisfaction and understanding (Harland, 1996). Through a comparison of companies in the automotive aftermarket in Spain and the UK, Harland (1996) showed that the satisfaction was the same both in the close and in the distant relations that were studied and argued that the circumstances decide what kind of relationship is the most appropriate. Harland emphasised these surprising results since the more common assumption is that closer relationships lead to greater satisfaction and understanding.

Another prerequisite for developing an effective long-term relationship is a small supply base (Sarkar and Mohapatra, 2006). Although some companies have thousands of suppliers, a few products often constitute the major parts of the companies' purchasing costs; purchasing of these products is furthermore often concentrated to a limited number of suppliers (Gadde and Snehota, 2000).

2.3 Process development

When integrating the supplier in a buyer's processes, van Echtelt et al. (2008) differentiate between the strategic management arena and the operational management arena. The strategic arena contains processes which provide long-term strategic direction and operational support for the integration, while the operational arena contains processes which aim at the planning, managing and

evaluation of the integration. In order to succeed with integration of suppliers, it is argued that a combination of these two arenas is necessary.

Two other dimensions which are elucidated in the literature are the effective and efficient purchasing approaches and the difference between them. Janda and Seshadri (2001) relate to purchasing efficiency as the ratio between purchasing inputs and purchasing outputs, and purchasing effectiveness as having good supplier relations and perceived high quality of goods delivered. They further suggest that there is a need to include both these dimensions in order to provide a holistic view of purchasing performance. Purchasing approaches suitable for enhancing efficiency may be, for instance, dealing with few suppliers whereas effectiveness might be improved by maintaining long-term relations.

In an investigation of construction processes, Al-Sudairi (2007) simulated two different processes and showed a potential for increasing process efficiency by 21 and 50 percent. Fearne and Fowler (2006) conclude that focus on efficiency in the use of resources undermines effectiveness in delivering projects. They conducted case studies of construction projects that had adapted lean thinking and argued that construction projects to a large extent are exposed to uncertainties. In order to deal with these uncertainties, practises not considered lean made practical sense and enabled the projects to proceed more effectively. They further argue that in order for the industry to advance in both efficiency and effectiveness, an integrated and customised approach is essential. This integration requires a fundamental change in the relationship between contractors and suppliers. Along the same lines, Panizzolo (1998) studied 27 leading international firms that had adopted lean production, identifying the major challenges and difficulties with its implementation. Panizzolo argued that management of external relations was the major problem and that the challenge lies in how to integrate external value-adding organisations into the value process.

As further debated by Rozemeijer (2008), customers need to be in control of their operative processes in order to be perceived as attractive customers. Joshi (2009) pointed out a disadvantage with the customer controlling the suppliers' processes, which is that supplier knowledge might decrease. An explanation for this might be that the freedom of the supplier is constrained and that the suppliers might be acting opportunistically toward the buyer. Furthermore, van Weele (2005) argued that the organisational structure in many companies of today makes achieving close and effective cooperation with suppliers a complex process. Optimisation of flows involving several

organisations over numerous projects is, however, not something which has yet been a concern within construction organisations (Fernie and Thorpe, 2007) even though the potential benefits are apparent.

3 Method

In order to fulfil the aim of this thesis, which was to explore and increase understanding of the relationship between contractor and supplier, a two-year case study has been conducted where I was employed in the case organisation. In this chapter, my research process is described along with the research method, data collection and analysis. Finally, reflections on the method are presented.

3.1 Research process

While finishing my MSc in Civil Engineering and my MSc in Business Administration, I was working as project assistant in the division of Construction Management at Chalmers University of Technology when I was offered the opportunity to undertake this PhD project. I was employed by the case study organisation as an industrial PhD student during the research period to work in a development project at the purchasing department where I was focusing on supplier relations and supplier development. The project was run by a project manager along with a steering group who together were responsible for the main directions of the project. This influenced the choices of the research project's sub-studies that had to fit within the scope of the development project and also be useful for the organisation. This has furthermore increased the demand for applicability of the research results.

After a few months, the first sub-study began which focused on a specific contractor-supplier relationship, further described in Paper I. This case study provided me insights to how purchasing actually is conducted within Skanska and how supplier relationships are managed. Approximately one year into the research project, the second sub-study was initiated focusing on the purchasing department's perception of efficient contractor-supplier relations (see Paper II). Within the scope of this sub-study, the first formal interviews were conducted with people working at the purchasing department aimed at gaining a deeper understanding of the respondents' holistic view of purchasing and purchasing behaviour at Skanska. The third sub-study ran in parallel during my two-year period as an industrial PhD student employed at Skanska, compiling experiences from the case organisation and its people and is found in Paper III. In contrast to the other two sub-studies, this one continued even after I left Skanska.

After the two-year case study at Skanska between 2007 and 2009, I completed the research project at the division of Construction Management at

Chalmers University of Technology. By changing the context during the last nine months of the PhD project, I had the opportunity to reflect and get new perspectives of my experiences as an employee of Skanska, which increased my learnings and experiences. The outside perspective of the case study organisation fostered many ideas which may never have emerged had I continued as the insider I was during the first two years of the study.

3.2 Research method - Case study

Merriam (2009, p.14) refers to the overall aim of qualitative research as to "achieve an understanding of how people make sense out of their lives, delineate the process of meaning-making and describe how people interpret what they experience". As the aim of this thesis is to explore and increase understanding of the relationship between contractor and supplier, this corresponds to what Merriam (2009) defines as a basic qualitative study.

If the object of analysis in a qualitative study is bounded, Merriam (2009) further points out that the study would be a qualitative case study. Since the focus of this thesis is on Skanska Sweden and its supplier relations, the research method used was a case study which is an in-depth investigation of a contemporary phenomenon in a real-life context (Yin, 2009). Although the boundaries between the studied phenomenon and the context might not always be evident (Yin, 2009), the single most important characteristic of a case study is the delimitation of the object of study (Merriam, 2009).

Silverman (2005) stated that the probability of getting criticised for the choice of cases to study decreases if the selection is thought through and well motivated. At the time this industrial PhD project was collaboratively initiated by Chalmers and Skanska Sweden, the company was going through a major purchasing transformation. As a result of this initiative, a development project focusing on supplier development and supplier relations was initiated internally at Skanska which closely related to the aim of this research project. Also, as Skanska is a major player in the Swedish construction industry and is a well-known company, the results of this study may be easier to relate to.

For the first sub-study, where a specific relation with a supplier was further examined, the relationship between Skanska Sweden and Skanska Maskin was chosen. The choice of Skanska Maskin was due to it being Skanska Sweden's largest supplier (one subsidiary to Skanska Sweden is a slightly larger supplier, but is excluded due to it being solely used for import of material and is managed by Skanska Sweden's purchasing department). Moreover, the time-

frame of the existing framework agreement further made Skanska Maskin a suitable supplier to study. The fact that Skanska Maskin is an internal supplier to Skanska Sweden makes the business relation, to some extent, different to external suppliers. Nevertheless, this has facilitated the collection of data and enhanced the long-term thinking in the relationship from both organisations' perspective.

3.3 Data collection and analysis

During the two-year case study where I worked at the case organisation, field observations and individual interviews have been conducted as the primary data collection techniques. As a complement, group discussions and reviews of documents were carried out.

3.3.1 Observations

Continuous observations of the organisation have been conducted during my daily work. Yin (2009) differentiates between direct observations and participant observations. Since I have been participating in the organisation which I have studied, the observations in this thesis are categorised as the latter.

Merriam (2009) cited Gold (1958) who presented four different stances of the relationship between the observer and the case study organisation, which ranges from being a complete participant to being a complete observer. Next to the extreme of being a complete participant is participant-as-observer, which according to Bryman and Bell (2007) is applicable when a researcher is employed in the studied organisation as in my case. The participant-as-observer implies that the researcher's observer activities are subordinate to the role as participant (Merriam, 2009) as has been the case during this study where I also have been completely open about my role as researcher.

During the two-year case study, the observations have continuously increased my insight into the case organisation and contributed to my knowledge. Field notes have been taken in order to documents situations and activities which have diverged from the theories and ideal scenarios presented in the literature. For example, people at the purchasing department have mentioned difficulties with the purchasing transformation; this was, however, a subject that was mostly discussed around the coffee machine rather than in formal venues.

When the two-year case study was completed, the field notes were analysed and grouped in order to identify the most apparent and frequently

discussed constraints related to long-term supplier relations discussed at the purchasing department. These groups related to the contractors' organisational structure, the contractors' long-term/short-term perspectives, the business deal as well as the external environment and provided the foundation for Paper III of this licentiate thesis.

3.3.2 Individual interviews

During the research project, 37 individual in-depth interviews have been conducted, out of which 12 with strategic purchasers in the case study organisation's purchasing department, 10 with personnel within the production management of the case organisation (two of these respondents were interviewed simultaneously for practical reasons) and 15 with personnel in one supplier organisation. The interviews lasted from 40 to 90 minutes and were mainly conducted at the respondent's office or in an adjacent room.

The individual interviews have complemented the observations by providing an opportunity for issues from the observations to be discussed and handled in a detailed and structured manner. In order to capture the issues raised by respondents as well as get answers to the predefined questions, a semi-structured approach was used for the interviews. Open-ended questions were used to avoid leading the respondents, who were encouraged to speak freely. To increase the probability of correctly interpreting the respondents' answers, follow-up questions were frequently used. Although all interviews were audibly recorded with permission of the respondent, field notes were also taken in order to capture what was said before and after the interviews as well as to record the interviewer's reflections during the interviews.

In order to obtain additional information from the respondents, tasks were included in all interviews. The tasks included quantifying and ranking different statements and criteria related to the topics of the interview. The respondents were also asked to draw on paper what they were describing in words. These tasks helped to reduce the risk of misunderstanding the respondents' views.

The data collected from the interviews have been analysed in various ways. The quantifiable data were grouped in order to identify the criteria and statements that the respondents collectively considered as the most important; this also guided further analysis of the data. Furthermore, notes from the interviews were coded in order to systemise the data and thereby help to identify issues that at first glance might not have been obvious. Recordings of the interviews were listened to with the aim of identifying different perspectives of the issues discussed during the interviews. Since the analyses have shown

new issues which have been listened to and analysed again, listening, coding and analysis have been conducted in an iterative process.

3.3.3 Group discussions

In addition to the field observations and individual interviews, several group discussions have been conducted with the dual purpose of exploring and testing ideas and findings.

As I have been part of the everyday work at the purchasing department, there were many opportunities to discuss questions and findings with people of the case organisation. These opportunities have foremost been during daily operative meetings and workshops where the purpose of the gatherings not has been the research project. Even though the topics of these discussions have differed from very broad to very narrow, I have continuously had the opportunity to discuss specific research questions and my research in general with the people in the case organisation. Because the participants have interacted during these gatherings, valuable insights have been added to the data.

In addition, group discussions has also been conducted with the main purpose to discuss the findings and results of the different studies in this research project. This has been done in order to further increase my insights and develop the results of the sub-studies. These group discussions have resulted in new analyses and groupings of the findings, which was due to the fact that participants saw things and perspectives in the analysed data that they had not seen in the raw data. The discussions of the findings have therefore been a critical step in the justification of the results and their application to the case study organisation.

3.3.4 Documents

As a complement in the previously presented data collection, documents have been used for collecting data for this research project. These documents mainly provided background information for the study.

The documents used were for example purchasing statistics from the case organisation, order statistics from the studied supplier organisation, framework agreements and the proposal and decisions that were the foundation for the transformation of the purchasing department within the case organisation.

It should, however, be noted that these documents, foremost the statistics, have been taken directly from the case organisation’s internal systems without

being critically reviewed. Nevertheless, these numbers are the ones used by the case organisation for internal performance measuring and evaluation, which does not guarantee their correctness but at least have provided me a similar picture to the one that the organisation had at the time of the study.

3.4 Reflections on the method

The method used in this research has its limitations as do all methods. As I have chosen the respondents of this study mostly by myself and on some occasions together with representatives of the case organisation, there is a risk that the answers and opinions may not be representative of the organisation as a whole. Furthermore, as the respondents have been aware of my role as researcher and of the research topic, their answers might have been biased towards satisfying me as an interviewer. In addition, the respondents might have tried to paint a picture of the company which reflected an ideal state rather than the actual state. I have attempted to overcome this by follow-up questions and informal talks before and after the interviews.

Due to the participatory nature of this research, a reflexive and critical stance has been maintained during the study in order to mitigate bias. There is, however, the possibility that I have been influenced by the people within the case organisation to a greater extent than realised. Therefore, the period after the case study when I returned to the university has been important in order to decrease the impact of those influences.

To further mitigate bias the research has continuously been discussed with peers, both individually and in workshops. As this industrial PhD project has been funded through a European Erabuild project, academics from Denmark, Finland and France have reviewed the studies and results. In addition, industrial peers have got the opportunity to review and discuss the results through a reference group constituted of competitors and suppliers to the case organisation as well as clients and people from within the case organisation. Finally, parts of the research have been presented at academic conferences and peer-reviewed for publication in academic journals, which has contributed to ensuring the quality and news value of this research.

4 Summary of the papers

As described in the introduction of this thesis, the three papers concern the interface between a major contractor – Skanska Sweden – and its framework agreement suppliers. In this chapter, the papers are summarised along with additional insights which have arisen during and after the studies. The papers each have answered one of the research questions of this thesis:

RQ 1) What are the strengths and weaknesses in the interface between major contractors and their largest suppliers?

RQ 2) What are the main criteria for efficient buyer-supplier relations related to the characteristics of the construction industry and large contractors?

RQ 3) What are the perceived constraints when establishing and maintaining contractor-supplier relations in the construction industry?

4.1 Paper I: Initiating supplier development through value stream analysis: the case of Skanska Sweden and its largest supplier

With the ambition to investigate a contractor-supplier relationship, understand the relationship dynamics and answer research question 1, a case study was used to identify strengths and weaknesses in the interface between a major Swedish contractor – Skanska Sweden – and its largest supplier – Skanska Maskin –, a supplier of rented construction machinery.

It was found that the personnel at the supplier in many cases exert themselves to fulfil the needs of the projects, often at very short notice, which was highly appreciated by the personnel in the contractor's projects. From a total of 181 investigated orders, 75 were required to be delivered to the projects the same day; of these, as many as 32 were required immediately. To meet this uncertain demand from the buyer, the supplier's activities were flexible, allowing many possible ways of carrying out an activity. For example, the supplier's sales personnel personally delivered machines to projects in urgent cases.

A question that arises is whether the supplier may be too flexible. Skanska Maskin's philosophy is to satisfy the customer, but to what extent should suppliers adapt their practices to the needs of projects, and do the

projects necessarily know which solution is best for them and for the relationship as a whole? Flexibility has been argued to be difficult to handle due to uncertainties on the demand side of the relationship. The uncertainty in the demand is often neglected when it comes to the development of the relationship.

With a rigid culture of satisfying the customer needs at all cost, the supplier in some cases finds alternative solutions which might not be optimal from a holistic relationship perspective. Some sort of flexibility might be needed in order to parry and cover up the uncertainty on the demand side. This is, however, a costly solution and a question which arises is whether the customer is aware of the alternative cost of a decision? Consequently, another question arises: Would the customers reconsider their behaviour if they visualised what actual cost a decision leads to? Maybe it would be possible to see a changed behaviour if only the consequences were visualised and the actual effects on the project economy could more easily be understood. These are questions of interest for further study.

4.2 Paper II: Criteria for achieving efficient contractor-supplier relations in the construction industry

Paper II aims at answering research question 2. Based on the views of strategic purchasers within a large contractor's – Skanska Sweden's – organisation and drawing on the general literature on buyer-supplier relationships, the purpose of this paper was to identify criteria for achieving efficient contractor-supplier relations in construction.

Achieving efficient contractor-supplier relations has been defined as cutting costs and reducing lead times through reciprocal involvement by contractor and supplier in the interface-related value creating processes. As a result of this study, the most eminent relationship enablers are identified to be total cost focus, aligned core values as well as willingness and capability for collaboration and development.

It is not always possible to increase the efficiency of the interface-related value creating processes in the relationship just by aiming the development and improvement efforts towards these processes; the root cause might instead be related to the input variables – the relationship enablers.

It might, however, be a tough challenge for the contractor to see the connection to the softer input and their effects on the efficiency of the

contractor-supplier relationship and the corresponding output. It is further argued that contractors need to be in control of their operative processes in order to be perceived as an attractive customer, but that the relevant relationship enablers need to be in place in order to manage this.

Many of the enablers are, however, dependent on continuity in the relationship and therefore a long-term orientation from the buying organisation is essential. The industry, however, and especially the contractors, seems hesitant towards initiating formalised long-term relations with their suppliers.

The insight about the complexity of this type of relationships between contractors and suppliers has emerged during and after the study. The ambition to formalize and partly standardise relations puts great pressure on the contractor who is actually demanding this kind of relation. But what are the actual benefits for the supplier to initiate long-term relations if the customer does not act in a similar manner, but rather individualises its ways of working in accordance with the project manager and the specific project?

Instead of trying to form the behaviour of the organisation by simply introducing new routines and new ways of working, a major effort might be aimed at the organisational culture and the underlying values of the organisation and its people, i.e. the relationship enablers. A more thorough discussion of the perceived constraints related to contractor-supplier relations has formed the basis for the third paper in this thesis.

4.3 Paper III: Perceived constraints when establishing and maintaining contractor-supplier relations in construction

In order to answer research question 3 and based on a two-year case study of Skanska Sweden, the aim of this paper was to identify and discuss perceived constraints related to establishing and maintaining contractor-supplier relations in the construction industry.

As a result of the study, eight perceived constraints have been identified and divided in four groups: the contractor's organisational structure; the contractor's long-term/short-term perspective; the business deal; and the external environment.

Regarding the contractor's organisational structure, many decisions are made locally in the organisation and have a tendency to see to the good of the project rather than the good of the organisation as a whole. Furthermore, the

major contractors carry through thousands of projects each year. In these projects, the ways of working are very individual and are related to the specific project manager rather than to the company of which the project manager is a part. Hence, when the supplier approaches the projects there are different ways the project management wants the ordering and delivery to be conducted, making the situation for the supplier very difficult to manage. One way for the suppliers to manage the inconsistency in the project's ways of working has turned out to be differentiated prices; these could be seen as an additional cost when the supplier does not consider the project manager to be good enough.

Concerning the contractor's long-term and short-term perspectives, it is apparent that while long-term thinking is favourable for reducing transaction costs and increased productivity, measurements and incentives systems still drive the organisation to a short-term perspective regarding supplier relations. Measures and incentives systems encourage reduction in prices each year, which could be seen as a major indicator on the contractor's short-term approach. It is further argued that proper organisational foundation is needed before initiating supplier development and long-term relations. When looking at the supply base at the case organisation, they are, however, currently dealing with approximately 28,000 suppliers where more than 25 percent of the case organisation's purchased volume is delivered by 0.13 percent of the suppliers. Furthermore, almost 9,000 of these suppliers sent only one invoice to Skanska Sweden, which indicates that there is much to deal with before starting to involve the suppliers.

The third group concern the business deal where the majority of the largest suppliers deliver less than ten percent of their turnover to the contractor. With this relatively small impact on the supplier it could be questioned whether the supplier is interested in engaging in long-term relations with the contractor. Furthermore, it is generally argued that specifying what is going to be bought is a prerequisite for purchasing. Despite this, several examples of the contrary have been seen. An actor with a major impact on this issue is the client, since clients in many cases prescribe the parts of the construction object while the strategic purchasers argue that they need a functional specification instead of just a brand and a model. An effect is that the contractor has to purchase from suppliers' ordinary product range rather than specifying what is actually needed. This matter further affects the possibilities of building long-term relations with suppliers since it is not always possible for the contractor to choose the preferred suppliers.

Lastly, the external environment plays a role. As Skanska Sweden is a national based subsidiary of a global company, an ideal situation would be to develop long-term relations with suppliers that also do business in all regions. There are, however, few suppliers that fulfil that criterion since the vast majority of suppliers are local, especially service suppliers. Furthermore, the best opportunity to establish and maintain efficient contractor-supplier relations occurs when supply and demand balance; however, supply and demand never is in full balance. The contractors use this situation instead of focusing on long-term benefits. For instance, when the market was good Skanska Sweden had to buy a certain product from all suppliers active in the Gothenburg region; in contrast, when the market fell in 2008/2009, the top management gave strong recommendations to the suppliers to reduce prices in order to keep their framework agreements.

As has been seen, many of the perceived constraints in this paper are related to the contractors' organisations. Hence, the contractors play a major part in establishing and maintaining contractor-supplier relations. Consequently, it is questionable if the contractors are mature enough to deal with the suppliers' processes when they do not have control on their own situation and their own processes. Furthermore, it is apparent that different suppliers need to be differentiated and that different approaches are required from the contractors. Approaches need to be adapted in order to manage the different needs of material suppliers and service suppliers as well as the different needs of local, regional and national suppliers.

5 Discussion and recommendations

With the purpose to explore and increase understanding of the relationship between contractor and supplier, a two-year case study of a major Swedish contractor has been conducted. As the research questions each have been answered in the previous chapter, this final chapter presents a concluding discussion which is followed by three recommendations to large contractors.

5.1 Concluding discussion

Relationships between the different parties within construction have been discussed for several years. The focus of these discussions has mainly been related to the relations between client and contractor, whereas this thesis aimed at elucidating the relationship between contractor and supplier. Of course, the characteristics of construction and the perceived constraints discussed in Paper III may make it seem impossible to ever fully manage the contractor-supplier relations in this sector in a satisfactory manner; it is, however, essential to understand the conditions and perceived constraints and see these as starting points and influencing factors instead of as insurmountable obstacles.

The contractors do, however, need to take responsibility. Contractors need to get control of their own internal processes before trying to develop their relations to the suppliers. In the construction supply chain literature it has been argued that the relations within construction build on individual rather than organisational relations, which might be an indication on the effects of the individualised processes in construction. Furthermore, suppliers have been treating the contractor's different projects separately by differentiating their prices depending on the project management, which is a clear indication on the importance from their side in this matter. In order to facilitate development of a mutual process between contractor and supplier, the interface towards the supplier needs to be similar for all projects. Otherwise suppliers need to adapt their processes for every single project; hence, the potential benefits of mutual development of the relationships will not be realised.

Uncertainty is an inherent feature of construction. As discussed in Paper I, orders often arrive at the supplier with a demand for immediate delivery. This behaviour gives the supplier a possibility of acting highly flexibly in order to achieve customer satisfaction, but also an opportunity to price their services thereafter. Even though adaptability, flexibility and fast deliveries from the supplier are highly appreciated by the contractors' project management, it is not

sustainable with a standard setting which is adapted to satisfy these urgent needs. The supplier should be able to satisfy the urgent needs, but the standard setting from the supplier's side should benefit the ones who are following the process which is preferred from a holistic relationship perspective and is developed with a total cost focus.

The complexity of the relationship could be highlighted by asking, and trying to answer, questions like: What happens when the project management places an order with a supplier? What does the supplier do to fulfil the order? What happens if the order is changed? Which are the consequences for the supplier? How much extra time is needed to manage the change order? And what are the additional costs? Visualising the operational relationship between contractor and supplier, by concretely depicting possible consequences and making the involved actors aware of consequences, may influence the actors to take a holistic relationship perspective when making decisions. Who would insist on requiring a delivery without advanced planning when the extra costs are explicitly shown and the demand is not even that urgent?

As discussed in Paper II, in order to develop the contractor-supplier processes, the root of the problems need to be addressed. Instead of address the processes and routines directly, the foundation of the processes, routines and relationships – the relationship enablers – need to be addressed. Total cost focus, aligned core values as well as willingness and capability for collaboration and development have been argued to be essential prerequisites to succeed with the development of efficient mutual processes. These relationship enablers often take time to build and evolve, which emphasises the argument that long-term orientation from both parties is essential. Long-term orientation implies commitment and puts great pressure on both involved parties to foster an organisational culture that rewards this type of behaviour, instead of short-term project profit maximisation. The internal performance measurement and incentive systems therefore need to be aligned with the long-term orientation. It might, however, be difficult to get all suppliers involved in the mutual development of relationships why it is important to thoroughly consider which suppliers to approach. As the supply base tends to be rather fragmented, investigation of power relations and context is advised prior to initiation of long-term relationship.

By developing the relationships with the suppliers, contractors might take an additional step in the construction supply chain. As has been argued, relationship thinking has so far solely been focused on the relationship between client and contractor while the relationships downstream from the contractor

have been neglected. Hopefully, this thesis has increased the understanding of the contractor-supplier relation so that contractors may see the potential benefits of developing their relations with the suppliers. Also, the contractor-supplier relation is an area that warrants more research. As further research it would be valuable to go deeper and investigate the differences between relationships concerning material and service suppliers as well as regional and national suppliers. Furthermore, the effects of differentiation as well as the possible influence of the power dependency between the involved parties would be an issue for further research. Additionally, an area of interest for further studies is the implementation of mutual processes for contractor-supplier relationships and the effects such an implementation would have.

5.2 Recommendations for major contractors

Based on the results of this thesis, the following three recommendations for large contractors have been formulated in order to realise the potential related to development of contractor-supplier relations:

Concretise and visualise the relationships. The demand side in the contractor-supplier relations suffer from inherent uncertainty, which requires flexibility from the supplier. This flexibility is widely appreciated within the projects, but does not come for free. As contractors' organisations are founded on local decisions and project profit maximisation, it is recommended that contractors concretise and visualise the relations to their suppliers and also the consequences which certain actions of the projects might infer for the suppliers. By concretising and visualising the relations and the possible effects of decisions, it might be possible to achieve a foundation for decision-making for the project management which encourages decisions which are preferable from a total cost perspective of the relationship.

Build a united interface towards the suppliers. Contractors need to be perceived as attractive customers in order to get the suppliers to be willing to commit to mutual initiatives. Today, the ways of working are more related to the specific project management than the company why suppliers need to customise their processes to every single project. It is recommended that contractors implement similar ways of working with their suppliers in each project and offer the suppliers a united interface throughout the organisation, independently on the specific project management. To achieve this, top management might need to provide directives which are to be followed, rather than only be considered as recommendations within the organisation. Achieving

a uniform interface towards the suppliers is an essential prerequisite for development of reciprocal relations.

Dare to commit long-term. To be able to develop the relations with the suppliers and make it possible to realise the potential related to a purchasing volume amounting to over 70 percent of the turnover, contractors have to dare to be long-term. A fruitful relationship is not built quickly and by only being loyal when it is beneficial to oneself. Neither is it possible to have a deeply developed relationship with all available suppliers in the market. Hence, it is recommended that contractors dare to commit to long-term oriented relations with a selected range of suppliers. By doing this, it is possible to mutually develop an efficient and effective reciprocal process which will provide a competitive edge for large contractors.

As can be seen, the three recommendations are pointing to rather large questions for the contractors. This is nothing which is to be taken lightly, but major efforts are needed. The first recommendation is primarily directed to the purchasing department that has to do their homework and make the whole organisation aware of the effects and costs of decisions from the project management such as late orders, changed orders and disloyalty to the framework agreement suppliers. Next, the top management of the contractors' organisations need to take their responsibility and get their organisation to follow the ways of working which are preferable from a total cost perspective. This in contrast to, rewarding local initiatives which might seem profitable when looking from a local perspective but rather drive additional cost and increased prices from the suppliers without adding any increased value. Lastly, if the potential of developing the relationship with the suppliers is to be realised, top management also need to disseminate a long-term attitude within the organisation, not only in the relationships with the clients but also in the relationships with the suppliers.

The contractor that dares to take on these recommendations has the opportunity to reap the potential benefits of addressing and developing over 70 percent of its turnover, which otherwise will stay out of its control. Even though the initial efforts might seem large, the contractor which takes control over its supply chain will gain them a valuable competitive advantage.

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Paper I

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INITIATING SUPPLIER DEVELOPMENT THROUGH VALUE STREAM ANALYSIS: THE CASE OF SKANSKA SWEDEN AND ITS LARGEST SUPPLIER

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Even though the manufacturing industry has benefited from Supplier Development and Value Stream Analyses during the past twenty years, the construction industry has lagged behind in this respect. This may be because the geographically spread and project-based nature of the industry together with the desire to maximize profits in every construction project, gives the industry a unique character. The purpose of this case study is to identify the strengths and weaknesses of the interface between a major Swedish contractor and its largest supplier, a construction machinery rental company, using a Value Stream Analysis approach. By interviewing key individuals in both organisations and studying historical data of deliveries, the major interface issues have been identified as related to flexibility and uncertainty in the construction process. For instance, orders from the contractor were placed so late that the supplier had to compromise their ordinary processes in order to satisfy the contractor's demands. Considerable potential for decreasing total cost for the delivery process have been identified as a result of the study and the main conclusion is that efficiency in the interface between contractor and supplier can be improved by reducing the flexibility in their relationship.

KEYWORDS: construction industry, service blueprinting, buyer-supplier relationship, case study

INTRODUCTION

During the last couple of years, distinct changes in the Swedish construction industry have been seen. An increasing number of international actors have entered the market using methods and strategies new to the Swedish market, resulting in a new kind of competition. As a result of the increasing competition, Swedish construction companies need to develop new strategies for increasing productivity and decreasing total costs. Strategies adopted by several Swedish contractors relate to purchasing patterns. This may have been as a result of realising that approximately 80% of contractors' turnover is related to the purchasing of products and services.

The construction industry is characterized by a geographically spread and project-based structure where every project is run as though it was an individual company with the associated responsibility to deliver good financial results. Furthermore, communication between projects is limited, resulting in minor dissemination of knowledge and experiences within companies. Consequently, project managers tend to rely on their own supplier base

and their own way of working with suppliers. Supplier issues have been researched in other industries for decades with the Japanese automotive industry leading the way. However, since the characteristics of industries are quite different, it is not considered appropriate to transfer research from another industry, automotive or otherwise, to the construction industry.

This study therefore addresses a need for research into the interface between contractors and suppliers exclusively for the construction industry. Using a Value Stream Analysis approach, a case study was used to identifying strengths and weaknesses in the interface between a major Swedish contractor, Skanska Sweden, and its supplier of rented construction machinery, Skanska Maskin. Skanska Sweden is a subsidiary of the global construction company Skanska AB and Skanska Maskin is a subsidiary of Skanska Sweden.

SKANSKA SWEDEN

Skanska Sweden is one of the major construction companies in Sweden with a turnover of MSEK 27,389 in 2007, during which time they were continuously active in approximately 3,000 projects. Their vision is to become a role model in Swedish industry but they firstly aim be the most professionally outstanding construction company in Sweden. Skanska Sweden is organised in 25 regions of which 12 are focused on civil construction and 11 on building construction. Two regions are so-called special units whose activities do not form part of Skanska Sweden's core business but are considered of such importance to the core business that they have been kept in-house. Skanska Maskin is one of these special units.

In 2007, 71.5% of Skanska Sweden's turnover consisted of purchasing costs. Purchases are mainly divided in two sorts, project specific purchases and coordinated purchases. Project specific means that sourcing is conducted for every specific project and thereby the suppliers are continuously exposed to competition. Coordinated purchases are built on framework agreements with the supplier and from Skanska's side the agreement part is either Skanska AB or Skanska Sweden. Of the total purchased volume during 2007, coordinated purchasing accounted for 30%.

The total supplier base of Skanska Sweden consisted of 28,000 suppliers in 2007, of which 10.26% of the suppliers represented 90% of total expenditure. Approximately 600 of these suppliers have signed a framework agreement with Skanska Sweden, the largest of which is Skanska Maskin to whom Skanska Sweden paid MSEK 454.2 during 2007.

SKANSKA MASKIN

The interface between Skanska Sweden and Skanska Maskin is two-fold. In addition to Skanska Maskin being a wholly-owned subsidiary of Skanska Sweden, Skanska Maskin is also Skanska Sweden's single largest supplier. Its vision is to self-evidently become the construction industry's best service partner by working closely with customers; it had a turnover of MSEK 542.3 during 2007. Skanska Maskin specialise in delivering knowledge, service, machinery, equipment and utilities for the construction industry and its fleet comprises approximately 45,000 units. In 2007 it employed 313 workers.

Skanska Maskin is geographically divided into three districts in Sweden: the Northern, Western, and Southern districts. In each of these districts a main depot is located where the offices and the major part of their business are located. In addition to the three main depots,

13 minor depots of varying size are geographically spread throughout Sweden. These minor depots hold a small stock of units for delivery and also serve as a return centre for projects nearby. Most of the deliveries from Skanska Maskin are made from the main depots.

Skanska Maskin's main business is rental of construction equipment and machinery and is mainly divided into five business areas: builder's huts, machinery, lifts, logistics, and service. This study focuses on construction machinery and the associated services and logistics.

FRAME OF REFERENCE

Contractor-Supplier Relations

Literature about relations between contractors and their suppliers often discusses temporary contract relations, especially how and the criteria on which contractors should base their choice of suppliers for specific projects. There are less papers dealing with studies relating to how long-term relations can be developed, even though there is a common view that long-term relations between companies reduce problems and lead to better products. The idea is that historical collaboration and expected future collaboration leads to higher efficiency and better results. Kamann et al. (2006) show in a study of 448 contractor-supplier relations that this correlation can be found especially in cases where individuals rather than firms have historical and expected future collaboration.

Supplier development has received increased attention in other industries. For example, Rogers et al. (2007), evaluated supplier development programs in the North American automotive industry, while Sánchez-Rodríguez et al. (2005) shows in their study of 306 manufacturers in Spain, that performance had been positively influenced by applying processes and methods for supplier development. In the construction industry, Errasti et al. (2007) studied development of partnership with sub-contractors and argue that bigger purchasing volumes and fewer suppliers leads to significant improvements.

Krause and Ellram (1997) argue that supplier evaluations are necessary for more systematic supplier development while Carr and Pearson (1999) found that implementation of supplier evaluations in itself leads to increased profits. One discussed reason is that evaluations make it more evident for the customer what is important. Nevertheless, the ambition with supplier evaluations has to be higher than that. A great number of models for evaluating suppliers have been developed over the years. One such model was developed by Safayeni et al. (1992) and Purdy and Safayeni (1993), who focused on supplier working processes and an evaluation of their management systems. Another model was developed by Tracy and Vonderembse (1999), who aimed at understanding how supplier evaluation criteria and supplier performance influence the bottom line.

Value Stream Mapping

Value stream mapping is an analysis method for identification and removal of non-value adding activities in processes, in order to improve productivity. It was initially developed in 1995 and is often linked to lean thinking (Hines et al., 1998). Hines and Rich (1997) presented a correlation matrix of seven value stream mapping tools and seven wastes from the Toyota production system (see for example Liker, (2004)) as well as an overall value stream structure. The correlation matrix shows different tools along with their ability to identify specific wastes and presents the process activity mapping tool as the most

comprehensive of the investigative tools. Furthermore, Panizzolo (1998) studied 27 leading international firms that had adopted lean production, identifying the major challenges and difficulties with its implementation. Panizzolo argues that management of external relations was the major problem and that the challenge lies in how to integrate external value-adding organisations into the value process. He further states that the focus must move from operations management to relationship management.

Twelve rules for simplifying material flow were presented by Towill (1999), who argues that this is closely coupled to elimination of waste in supply chains. The main issues are elimination of all uncertainties in all processes as well as the streamlining and visualising of all information flows. The elimination of uncertainties in the processes are based on a four dimensional model called the uncertainty circle. The four dimensions are supply side, control system, value-added process, and demand side. Mason-Jones and Towill (1998) state that all four dimensions are necessary to investigate reducing uncertainties since they are all significant and of approximately equal importance. They also argue that many companies focus their effort on value-added processes and the supply side while neglecting control systems and the demand side, resulting in remaining supply chain uncertainty.

A more critical view was taken by Fearne and Fowler (2006) who conducted case studies of construction projects that had adapted lean thinking, studying the potential effects of having too narrow a focus on lean issues. They conclude that focus on efficiency in the use of resources undermines effectiveness in delivering projects. They argue that construction projects to a large extent are exposed to uncertainties and in order to deal with them, non-lean practises sometimes make practical sense and enable the project to proceed more effectively. They further argue that in order for the industry to advance in both efficiency and effectiveness, a more integrated and customised approach to lean thinking is essential. This integration requires a fundamental change in the relationship between contractors and suppliers.

Service Blueprinting

Shostack (1984) presented a value stream mapping method called service blueprinting. The method deals with some of the issues discussed above by focusing on the relationship between customer and supplier and by presenting a method for visualising the complexity and divergence in the interface. Additionally, Bicheno (2004) argue that service blueprinting is particularly applicable when there are multiple contacts between supplier and customer, which is the situation with Skanska Sweden and Skanska Maskin. Service blueprinting was therefore chosen as the analysis tool for this case study.

Shostack (1987) suggested that when it comes to service, it is often easier to define what is done rather than how it is done. However, the use of service blueprinting facilitates the engineering of processes at the drawing board and can also be used for educational purpose as well as comparative and competitive assessment. Additionally, blueprints provide participants with a holistic view of the process rather than just the specific part that they are responsible for, and are more useful if produced for a specific process rather than as a generic visualisation.

Furthermore, Shostack (1987) identified two dimensions of the service process. The first dimension she termed complexity, which is the number and difficulty of the steps, whilst the second dimension she termed divergence, which is the degree of freedom in the execution of the steps. Shostack's study found that a process with greater divergence often commands

higher prices due to flexibility and customization and is also more difficult to manage, control and distribute. Consequently, she proposed two alternative ways of making the process more efficient: either by decreasing complexity or by decreasing divergence.

METHODOLOGY

In order to understand the relationship between the customer and the supplier, a total of 25 interviews were conducted. Ten of the interviews were conducted with respondents on the customer's side, lasting 45 to 90 minutes. These interviews were primarily individual, although on one occasion two respondents were interviewed simultaneously. Eight respondents were production managers and two were foremen who between them represented building and civil engineering projects of all sizes across the customer's entire geographical area of operation. On the supplier's side 15 individual interviews were conducted lasting 40 to 65 minutes and, in order to get an overall picture of the interface, the respondents represent all three main depots and all five of the supplier's business areas. All respondents had continuous contact with other parties in the interface. Interviewees were encouraged to speak freely but a semi-structured approach was adopted in order to keep the discussion within the intended area. As a first step, respondents were asked to describe the interface between customer and supplier and also to sketch the interface along with the most important activities. The discussion was then based on this description in order to cover the entire interface and minimize the risk of getting stuck in a specific area of discussion. Respondents were not only asked to identify strengths and weaknesses in the relationship but to also put forward suggestions for improvement and to explain how such improvements would develop the interface.

In addition to the interviews, two workshops were carried out with the management team of Skanska Maskin and the purchasing team from Skanska Sweden. These workshops focused on the effectuation of the case study and the preliminary results. Furthermore, statistics of the deliveries were obtained from the supplier, which contributed to the empirical part of the study.

THE RELATIONSHIP

A clear picture of the relationship crystallised during the interviews. Even though the relationship was mostly described as well functioning and satisfactory, interviewees also highlighted parts of the interface that could be improved.

By discussing the different activities in the interface and the possible actions in each activity, a blueprint of the interface between Skanska Sweden and its largest supplier has been produced. The activities are in chronological order from left to right and positioned according to whether the activity is related to the customer or supplier; the intersections show where interaction between customer and supplier occur. The blueprint of the relationship is presented in Figure 1.

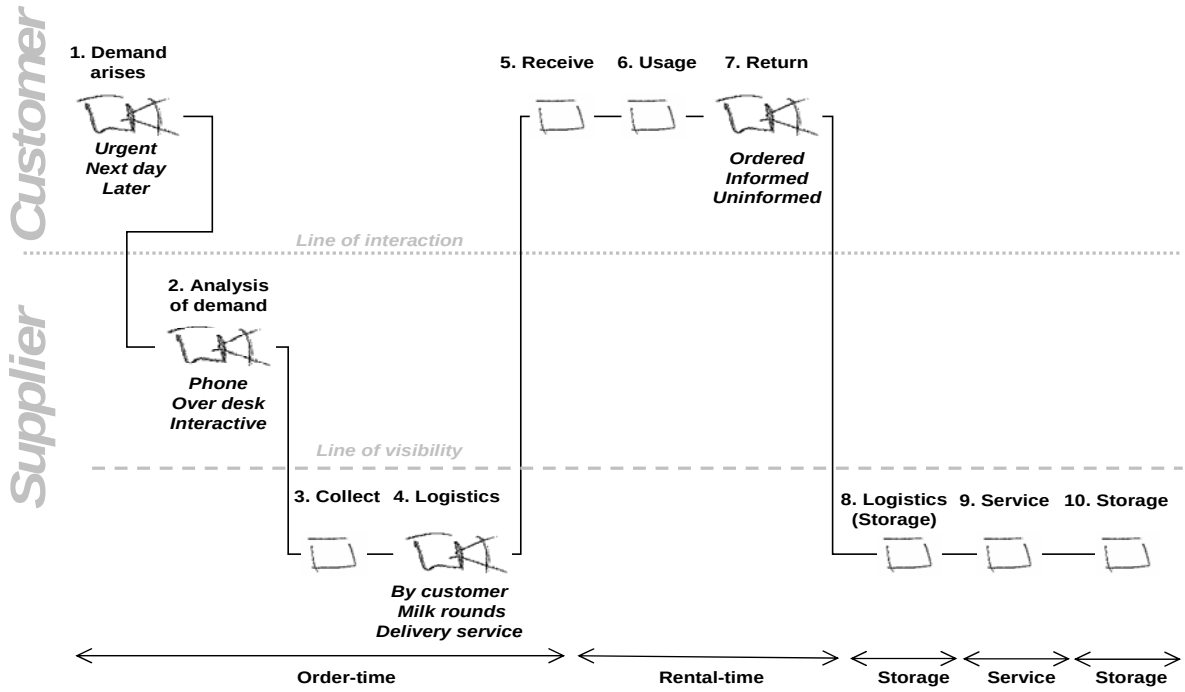

Figure 1. Blueprint of the interface between Skanska Sweden and its largest supplier

It can be seen from the blueprint that there are ten main activities in the interface. In the first activity, a demand arises for one of the supplier's products in the project. The product might be needed immediately so that delivery is a matter of urgency or it may not be needed until some point in the future in which case there is no urgency for delivery. However, one interviewee, a salesperson, said that "in most cases, the projects need the deliveries yesterday." Examination of 181 orders revealed the following: 75 orders were required to be delivered at the project within the same day, of which 32 orders were required immediately, hence with no planning from the projects; 89 orders needed to be at the project the day after the order; and only 17 of the orders were placed two or more days in advance of the required delivery date despite the fact that the supplier offers a rebate on all such orders.

The second of the main activities is the analysis of demand. Respondents revealed that approximately 50% of the time when an order is communicated to Skanska Maskin the customer has not yet decided what type of machine is needed. In such cases, the supplier's sales people often recommend machines suitable for specific situations since they possess knowledge of their mechanism as well as their uses. This service is greatly appreciated by customers and many of the respondents were full of praise for the supplier's competence in their field of knowledge. The analysis of demand is made in three different ways: by phone, through an interactive procurement tool, or over the counter when the customer visits the supplier. One of the goals of Skanska Sweden is that 100% of its purchases shall be done though the interactive procurement tool by 2010. However, according to statistics from the supplier, only 1.78% of the orders during 2007 were communicated through the interactive procurement tool with the remainder having been by phone or in person.

The third and fourth main activities concern collecting machines from the storage and transporting them to the construction sites. The collecting is primarily done by the logistics staff. However, in some urgent situations, the salespeople themselves will collect the

machines and prepare them for transport. This might also be the case when the inventory levels are low and the salespeople want to assure the customer that they will not run out of stock and that they will be able to deliver. When it comes to logistics several options are available to both the supplier and customer. According to an interviewee from Skanska Maskin, since all logistical costs are paid for by the projects it is possible to use whichever logistics solution they prefer. However, three alternatives account a majority of the deliveries. Statistics from 2007 show that approximately 46% of the transports are managed by the projects themselves, which might be through a trip to the supplier's office to pick up the machine in person or by hiring a logistics company to pick it up for them. Additionally, 22% are delivered through milk rounds managed by the supplier, and 12% are sent by a delivery service. The remaining 20% are difficult to categorise or are unspecified in the statistics. In addition to these alternatives, respondents from both the supplier and the customer described cases where salespeople from Skanska Maskin personally delivered the machines to projects if the situation was really urgent.

The fifth, sixth and seventh main activities are related to the receiving of the machines, the usage of the machines, and the returning of the machines to the supplier. The process of receiving the machines is quite different from project to project, although the supplier's logistics personnel claim that in most of the cases when the supplier manages the delivery a representative from the project has to meet up and confirm the delivery. According to one of the production managers this can be very time consuming, especially if there are many deliveries and they are spread out over the day. Once the machines arrive at the project the sixth activity, usage, takes place. Although usage was not further examined by this study, However, Josephson and Saukkoriipi (2007) presented a study of the usage of construction machinery and equipment in the Swedish context and conclude that machines are often used less than 10%, of the time that they are on site. A logistics interviewee employed by the supplier claimed that return of the machines is done in three different ways: ordered, informed, or uninformed. Ordered implies that projects contact the supplier and ask them to pick up the machines, in which case the same logistic solutions as in the fourth activity are used. Informed implies that projects contact the supplier and inform it that some returns are on their way, they can then be sent by delivery service or be returned with transport scheduled to deliver other machines to the project and would be going back to the depot anyway. The last way of returning the machines, uninformed, is similar to the previous method but without communication between the projects and the supplier. In such cases machines may not be found until weeks after they have been returned and negotiations will then have to take place between the project and the supplier in order to sort out if the project should pay for this period of time or not.

Generally for the fifth, sixth and seventh activities, supplier respondents stated that in many cases machines are held by the projects for a very long time and it is often unclear when they will be returned. Opinions as to whether this is for good or for bad vary greatly. On one hand a long rental period brings in more money for the supplier, on the other hand the machines are not inspected and serviced regularly, which might decrease their value and shorten their life-span. Statistics from the supplier for the five product groups with the highest purchasing value show that they were rented out 46% - 90% of the time during 2007.

The eighth, ninth and tenth activities concern the service and the storage at the supplier. Primarily the machines are received by the logistics department and then transported to the storage yard where they are stored until they are serviced. These storage yards are differently designed, but there are cases where there is only one way in and out of these. A consequence

of this is that machines placed in the back of the storage yard will receive service more seldom than the once that have recently arrived; a first in - last out approach. However, respondents from the service department pointed out that the machines in the back of the yard can be prioritized for service if the demand is very high. This prioritization is mainly initiated by the sales department and, according to the service personnel, is often done without prior consultation with the service department. After the service has been carried out, the machine is placed back in the storage until the process restarts.

In addition to the issues related to the main activities, some issues related to the relationship in general were pointed out by respondents. Firstly, in many cases there are too many contact persons involved in the interaction between the supplier and a project. Respondents pointed out that this can easily lead to misunderstandings and situations where they have to devote much time to determine what had been agreed in relation to specific projects. The second issue is the adaptability and flexibility in the relationship, which project respondents see as a very good feature. Supplier respondents mentioned many times that they do what they can in order to satisfy the customer and that in many cases they have to relinquish their ordinary processes to do so. One respondent claimed that Skanska Maskin spoils the projects by always doing what they can to satisfy them and that it probably would be a less stressful work environment for the supplier's personnel if they did not have to take urgent measures all the time.

Thus, ten main activities are carried out in the interface between Skanska Sweden and its main supplier where the general opinion expressed by the respondents is that these activities function well. Nevertheless, certain areas for improvement have been identified for both the main activities and for the relationship as a whole.

DISCUSSION AND CONCLUSIONS

The purpose of this study is to present strengths and weaknesses in the interface between a major Swedish contractor (Skanska Sweden) and their largest supplier (Skanska Maskin). By using Service Blueprinting-technique, the interface between them has been visualised and certain areas for improvement have been identified even though most of the respondents expressed satisfaction with the relationship. The greatest strength identified in the relationship was the supplier's competence with the products which facilitates the analysis of demand in the second main activity, while one of the weaknesses was related to the first activity, when the demand arises. It was found that the supplier in many cases does much to fulfil the need of the projects and in many cases at very short notice since as many as 75 of 181 investigated orders were required to be delivered to the projects the same day. Furthermore, it is evident that many of the supplier's activities are divergent or flexible, allowing many possible ways of carrying out an activity. For example, the supplier's sales people personally deliver machines to projects in urgent cases. According to Shostack (1987), such divergent activities often commends higher prices due to the flexible and customized service offered by the supplier.

Nevertheless, flexibility is a difficult issue to handle due to uncertainties on the demand side of the relationship and, according to Mason-Jones and Towill (1998), the uncertainty at the demand side of a supply chain relation is often neglected when it comes to supply chain development. A question that arises is whether the supplier is too flexible or not. Skanska Maskin's philosophy is to satisfy the customer, but to what extent should suppliers adapt their practices to the needs of projects and do the projects necessarily know which solution is best

for them and for the relationship as a whole. Even though the construction industry is a highly decentralised industry it might be a step in the right direction to reduce the flexibility in this kind of interaction, from a holistic supply chain perspective, in order to minimize the risk of a sub-optimised solution.

To conclude, the total cost of the relationship would most probably decrease if the processes at the interface could be determined and stringently followed, since the need for flexibility would not be necessary. However, since uncertainty in projects is a part of every-day work, the question of how much flexibility is needed in order to keep and improve the effectiveness of projects is a major variable in this kind of interaction.

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Paper II

Frödell, M. (2009) Criteria for achieving efficient contractor-supplier relations in the construction industry. S*ubmitted to Journal for review.*

Criteria for achieving efficient contractor-supplier relations in the construction industry

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Abstract
Despite numerous examples of benefits when adapting supplier relationship management in the manufacturing industry, the construction industry still lags behind in such areas as long-term relationships with suppliers and continuous cost-reductions. This may be because the characteristics of the construction industry differ from those of the manufacturing industry due to their project-based structure, its inherent tendency for sub-optimization and the vast number and variety of suppliers. The purpose of this study is to identify criteria for achieving efficient contractor-supplier relations in the construction industry and for large contractors. Drawing on the literature on efficiency and differentiation of efficient buyer-supplier relationships as well as interviews with strategic purchasers at a large Swedish contractor, relationship enablers as total cost focus, aligned core values as well as willingness and capability for collaboration and development must be in place for achieving an efficient contractor-supplier relationship. In order to achieve this, the contractor has to adopt a long-term orientation towards the relationship with the suppliers which is a decision for the management to make.

Keywords: Supplier relationship management, contractor-supplier relations, construction industry

1. Introduction

The search for criteria that distinguish efficient relationships between buyers and suppliers has been ongoing for the last few decades and has been a natural step in the advancement of supplier relationship management. Dyer et al. (1998) among others however accentuate that a buying organisation should not initiate partnerships with all suppliers, but differentiate the supplier base and the methods of working with them. According to Dyer et al. (1998, p.73), long-term relations and partnerships should be aimed at strategic partners which are ”suppliers that provide inputs that are typically of high value and play an important role in differentiating the buyer’s final product”, grounding this reasoning in studies of the automotive industry. Kraljic (1983) argued that long-term relations should be exclusive for a specific range of suppliers, namely those supplying scarce or high-value products where the complexity of the supply market is high and where the product is of great importance for the buying company. Furthermore, several studies have shown that long-term relations and partnerships

between buyer and supplier increase the financial and purchasing efficiency of the involved organisations (Janda and Seshadri, 2001; Carr and Pearson, 1999), and that commitment and trust are the cornerstones of these relations (Krause, 1999; Monczka et al., 1998).

However, most of the studies focused on the buyer-supplier relationship in the context of the manufacturing industry and studies in the construction industry are few. Research within construction has so far focused on relationships between contractor and client and ignored the relationship between contractor and supplier (Saad et al., 2002).

The construction industry is most often characterized as project-based with unique teams and rather limited knowledge dissemination and learning. Management is often considered to lack familiarity with local resources and conditions due to the geographical range of projects (Gidado, 1996) and projects also create their own culture because of the isolation of projects, resulting in difficulties of communication between projects (Gluch and Räisänen, 2009). In addition, inherent tendencies of sub-optimization throughout the projects and organisations as well as their vast number and variety of suppliers sourced for every single project is another often mentioned constraint. As these characteristics make the construction industry quite different from other industries, findings from studies of the manufacturing industry may thereby not necessarily be directly transferred (Errasti et al., 2007). This motivates further investigation of the situation between contractors and suppliers in order to sort out criteria for efficient relationships. Hence, based on the views of strategic purchasers within a large contractor and drawing on the general literature on buyer-supplier relationships, the purpose of this paper is to identify criteria for achieving efficient contractor-supplier relations in construction.

2. Frame of Reference

2.1. Efficiency as a concept for supplier relations

Efficiency is an expression often mentioned in the literature. However, what is meant by efficiency depends on the author and there are numerous definitions circulating. Tangen (2005) attempted to demystify the concept and explained it as: “Efficiency represents how well the resources of the transformation process are utilized” (Tangen, 2005, p. 43).

When looking at efficiency from a purchasing perspective, resources would be related to the purchasing function. Van Weele (2005, p.255) considered purchasing efficiency as a “relationship between planned and actual sacrifices in order to realize a goal” and contends that the essential resource is cost. Similarly, Janda and Seshadri (2001) argued

that purchasing efficiency is the ratio between purchasing inputs and purchasing outputs and pointed out that efficiency reduces costs and order processing times. They also claimed that the main strategy for making purchasing more efficient should be cooperative negotiations and interactions with a limited number of suppliers. This implies integrating suppliers into the value chain and striving for a win-win situation rather than maximizing self-gain.

It can therefore be concluded that efficiency relates to the utilization of resources in a value creating processes, which lies at the interface between contractor and supplier in the context of this paper. Since the transformation in this case is a joint process between the contractor and supplier, sacrifices have to be made by both parties who have their own ambitions and goals to fulfil. Achieving an efficient contractor-supplier relation would imply: cutting costs and reducing lead times through reciprocal involvement by contractor and supplier in the interface-related value creating processes.

2.2. Factors for efficient supplier relations in the literature

When studying how to achieve efficient buyer-supplier relationships, many researchers choose to do so from the buyer's perspective. For example, Monczka et al. (1998) identified critical factors for strategic supplier alliances based on qualitative and quantitative data from purchasing managers of 77 companies in various industries. The strategic alliances examined in the study were those where transactions were between buyers and suppliers. Monczka et al. categorized their findings into four groups: attributes of the relationship, communication behaviour, conflict resolution, and commodity/supplier selection process formalization, which are discussed below.

First, attributes of the relationship include trust, coordination and interdependence, which are considered essential for the relationship. Trust is argued to be the most critical factor and is founded in reliable role performance, cultural alignment, and interaction frequency. Trust is concluded to be stimulated by greater task coordination and by doing what is said to be done. Interdependence is said to exist when one actor does not control all of the conditions necessary for achievement of a desired outcome, but a reciprocal dependence is present.

Ryu et al. (2007) carried out a study within the manufacturing industry, investigating the criteria that positively affects a manufacturer to develop a long-term relationship with a supplier and concluded that trust in the relationship between manufacturer and supplier has a positive effect on the long-term orientation of the relationship. Ryu et al. (2007) argued that performance of the supplier is one of two facilitators for trust. The prior track record of the relationship is essential for initiating long-term orientation and may be reflected in the supplier's reputation.

Based on case studies of Canadian universities and education consortia, Pidduck (2006) claimed that previous mutual experience engenders trust. Reputation, which according to Pidduck is defined as the perception of quality over time, may not only be based on the company's own experiences but may also come from experiences in social networks and in informal networks. If the supplier's reputation is perceived as too high or too low, this may be detrimental for the buying organisation as a too low reputation may imply a low quality and a too high reputation may lead to the supplier trying to control the relationship (Pidduck, 2006).

Ellegaard and Ritter (2006) argued that attraction is a prerequisite for trust. Attractiveness implies that the customer creates interest from the supplier leading to benefits such as higher commitment of resources to the customer. Attraction between the parties is needed during the entire relationship lifespan and is argued to be a way of increasing the added value of the buyer-supplier relationship (Ellegaard and Ritter, 2006).

Second, communication behaviour concerns the information communicated to the other party in the relationship. Monczka et al. (1998) concluded that both the depth of the information, such as quality and participation, and the breadth of information, such as the extent of sharing, play an important role in managing the relationship. Moreover, Ryu et al. (2007) discussed the quality of shared information and argued that the information has to be credible in order to increase trust in the relationship.

Based on responses to a questionnaire survey from 527 purchasing executives in various industries, Krause (1999) explored factors that motivate buying firms' involvement in supplier development. He found that effective buyer-supplier communication is one of the factors and concluded that it is vital that suppliers are provided with the necessary information in order to ensure a high level of service. In addition to formal communication, he pointed out the importance of informal communication.

Third, conflict resolution relates to the manner in which conflict in the relationship is resolved. Monczka et al. (1998) advocated joint problem solving as a means for improving quality performance because it is more likely to lead to a win-win situation between the parties. Moreover, Krause (1999) argued that the buying organisation would like to see some evidence of the supplier's commitment to the relationship and that this may be fostered through the buying organisation's engagement in the supplier's problems. If the buyer is treating these problems as a matter of internal concern, the supplier may be encouraged to commit to a long-term relationship with the buying organisation (Krause, 1999).

Fourth, and last of the four group, commodity/supplier selection process formalization concerns the buying company's identification of specific commodities for relationship

development as well as formal processes for identification of appropriate suppliers. Monczka et al. (1998) contended that strategic relationships not should be pursued with all suppliers. They claimed that before initiating a long-term relationship, a formal assessment of the cultural alignment between the companies should be performed as well as of the supplier's capability to improve and willingness to initiate a long-term relation with the buying organisation.

Even though prior studies have shown how it is possible to strengthen the buyer-supplier relationship, fulfilling the criteria does not guarantee success. In a comparison of companies in the automotive aftermarket in Spain and the UK, Harland (1996) showed that trust, friendliness and co-operation in long-term relationships will not guarantee greater satisfaction and understanding. In the close and in the distant relationships that were studied, the satisfaction was equal why Harland (1996) argue that the circumstances decide what kind of relationship is the most appropriate. Consequently, relationships may be satisfactory whether they are distant and hostile or warm and friendly. Harland also showed that understanding between the parties is independent of the closeness of the relationship. These findings are surprising since the general perception is that closer relationships lead to greater understanding.

Ryu et al. (2007) argued that market conditions may influence the long-term orientation of the relationship. The conditions include the manufacturer's power over the supplier and uncertainty in the market. In relation to the power balance between the manufacturer and the supplier, Ryu et al. argued that a powerful manufacturer does not have the same incentive for building long-term relationships with their suppliers as a less powerful manufacturer. Consequently, a long-term orientation from the manufacturer's perspective is mostly applied by less powerful buyers, who do not have the same possibilities to ensure that their suppliers strive to fulfil their goals as the more powerful buyers who can use their power to make suppliers align their strategy with that of their own. Also the uncertainty of the market affects the manufacturer's willingness to develop a long-term relationship with the supplier because manufacturers in a volatile resource market tend to be more hesitant towards relationships with only a certain set of suppliers since these suppliers may not be able to deliver satisfactorily in a fast developing market. Based on a case study of a relationship between a major contractor and its largest supplier in the Swedish construction industry, Frödell and Josephson (2008) reported uncertainty as a major variable characterising this relationship. Uncertainty was also concluded to be a reason why higher flexibility may be commended in the relationship between buyer and supplier in a construction context, although it often results in a higher total cost.

2.3. Categorisation of criteria

Criteria for buyer-supplier relationships have been categorised in several ways by different researchers. A categorisation presented by van Echtelt and Wynstra (2001) relates to whether the criteria concerns input, throughput, or output of the relationship, where the throughput stage may be better known as transformation. The model was originally developed in order to understand how to manage supplier involvement in product development and addresses enabling and driving factors as well as processes and potential effects.

According to van Echtelt and Wynstra (2001), the input to the model can be divided into driving and enabling factors. Driving factors are defined as antecedent conditions in a company's internal and external environment that drive towards a specific form and extent of integrated product development. Examples of driving factors are: market uncertainty, R&D dependence, supplier dependence, company size as well as customer and supplier market competition. Enabling factors are defined as a set of factors or conditions whose presence help a company organise the required integrated product development including factors such as: internal organisation of purchasing and development team, exchange of information, compatibility of culture as well as trust and social climate. Wynstra et al. (2000) investigated driving and enabling factors in the context of purchasing involvement in product development and used a straightforward definition of the two. Driving factors were defined as *driving the need for* purchasing involvement while enabling factors were defined as *enabling the involvement* of purchasing.

The model's throughput is the basic processes connected to the operative and strategic work involved in managing supplier involvement. Since the processes are related to product development, this part is not further discussed in this paper even though some of the processes are similar to the ones related to supplier relationship management.

The last part of the model is the output of the potential effect of supplier involvement, which is divided into operative and strategic effects. Examples of the short-term operational effects are lower manufacturing costs, increased product quality and lead-time reduction; examples of the long-term strategic effects are better access to resources and knowledge as well as long-term alignment of strategies.

This paper proposes a model similar to van Echtelt and Wynstra's (2001) for categorisation of the criteria with some modifications to suit the nature of this study. The input category (enablers), concerns input from the two parties which affect the prerequisites for an efficient relationship. It addresses criteria relating to characteristics that are considered important for facilitating development of the contractor-supplier relationship to enable it to become more efficient. The throughput category (activities),

addresses the criteria directly related to the specific relationship and the direct contact between the buyer and supplier. The activities and processes in this category are linked to either the buyer or the supplier but may also be linked to the reciprocal interface. The output category (results), relates to the outcome of the relationship, which are the effects of the relationship from both the buyer's and supplier's perspective, such as mutual incentives and decreased total costs.

3. Method

The case study (Yin, 2009) used as a basis for this paper was carried out during 2008 by conducting in-depth interviews with 12 strategic purchasers at Skanska Sweden in order to identify the criteria that the organisation considered important. The respondents were chosen according to their position and type of managed category as presented in Table 1 below. The category managers at Skanska Sweden are responsible for sourcing and management of the supplier base in one or more purchasing categories. The category managers themselves do no actual buying, but represent the suppliers' formal contacts with Skanska Sweden at a strategic level. Purchases are performed at the production level of the organisation. A handful of category managers related to either material or services categories constitute a purchasing group, which is managed by a purchasing group manager. The purchasing group manager coordinates the group and is responsible for fulfilment of its goals and objectives, as well as being responsible as category manager for one or two categories.

Table 1. Position and category type of the respondents

	Category Manager	Purchasing Group Manager
Material	4	2
Service	4	2

The interviews were performed at Skanska's offices and lasted for 60 to 90 minutes. Each interview was recorded with the permission of the respondents, and field notes (Bryman and Bell, 2007) were also taken in order to capture what was said before and after the interview as well as the initial reflections during the interviews. A semi-structured approach was chosen for the interviews, allowing respondents to freely answer a number of questions concerning their view on what the supplier and the contractor have to live up to in order to achieve an efficient contractor-supplier relationship. They were also asked to describe the methods currently used to evaluate their suppliers and to explain any ideas they might have for developing the evaluations further Furthermore, respondents were asked to define and rank in order of importance five criteria that the supplier should fulfil and five criteria that the contractor should

fulfil in order to achieve an efficient contractor-supplier relationship. The criteria were later grouped based on similarity and the total score for each group calculated to provide an order of importance for an efficient buyer-supplier relationship.

The author has been employed by the case study company (Skanska Sweden) for the past two years, during which time the study was conducted. This provided opportunities for frequent discussions and workshops with stakeholders and purchasing management, which has added a unique perspective to the research and provided insights to the organisation that might not have otherwise been possible. Due to the participatory nature of this study, a reflexive and critical stance has been maintained in order to mitigate bias.

4. The Case

4.1.Skanska Sweden – the case company

Skanska AB is a construction company active on the European, American and South American markets. Skanska AB had a turnover of 143.7 billion SEK in 2008 and consists of nine business units of which Skanska Sweden (referred to as Skanska below) is one, contributing 30 billion SEK to Skanska AB's turnover. The vision of Skanska is to become a role model in Swedish industry while the business concept states that the organisation develop, build and maintain the physical environment for living, travelling and working.

Since 2006 Skanska has been going through a purchasing transformation where the purchasing department has grown from 30 to approximately 120 employees by the beginning of 2008. The purchasing department is centred on category managers who are responsible for relations with suppliers. The category managers have been recruited both internally and externally and hence have varying backgrounds. At the time of the study, Skanska had few standardised methods of working with its framework agreement suppliers, and because the category managers used different supplier relations methods it had a divided approach towards its supplier base. As a part of the restructuring process, efforts are now being made to identify how to differentiate efficient contractor-supplier relationships.

4.2.Skanska's view on efficient contractor-supplier relationships

Respondents were asked to freely explain the five most important criteria characterizing an efficient contractor-supplier relationship. The groups of criteria most frequently mentioned and therefore given the highest rank are presented below. As the respondents were asked to describe what suppliers have to fulfil as well as what contractors have to fulfil, the following section is divided into one part for contractors and one part for

suppliers. And, since the common understanding within the organisation is that the differences between procurement of material and the procurement of service are significant, presentation of the case study results are also separated along these lines. Accordingly, the results are presented thus: the criteria that material suppliers should fulfil, the criteria that service suppliers should fulfil, the criteria that contractors should fulfil concerning material suppliers, and the criteria that contractors should fulfil concerning service suppliers.

As the primary criterion for the material suppliers, *quality* was discussed extensively with respondents generally agreeing that suppliers should have good and reliable products, deliver on time, and have quality thinking through the entire supply chain. Quality thinking, however, is not developed overnight and one of the respondents claimed that: "It is really difficult for us (the contractor) to train a supplier to quality thinking, this is something that the supplier needs to have by themselves". Secondly, in relation to *total cost* respondents generally felt that the total cost or value of the product should be the primary focus rather than the price. The third criterion, *service to users (involvement)*, not only included suggestions that suppliers should manage their maintenance well but also that they should provide alternative solutions to problems and more efficient ways of using material and machines. For example, one respondent managing large investments stated that: "The supplier needs an organisation which is able to visit our construction sites to give advice on how to use their product in the most efficient way". The fourth area discussed was *professionalism* and concerned competence in both the product and the business relationship. Understanding of the customer's organisation and their demands was also mentioned as a part of this criterion. One respondent said: "You (as a category manager) do not need to be best friend with the supplier but you need to be able to show our (the contractor's) demands, and if the supplier does not think that our demands will be successful, they should tell us". Lastly, *resources for and a positive attitude to development work* were pointed out to be an important criterion for an efficient relationship, along with continuous improvement and a genuine will for improvement from the supplier's management and employees.

Just as it had been for material suppliers, *quality* was considered by respondents to be the primary criterion for service suppliers. However, unlike the material suppliers, knowledge along with delivery precision was also included as primary criterion. Also in accordance with the material suppliers, *total cost* was considered to be the second criteria but it was pointed out that the price for services outside the framework agreement is also important to consider when evaluating a relationship with this kind of supplier. Thirdly, the *core values* of the suppliers were discussed along with those of Skanska, which are that the people involved with the company shall be approachable, honest and responsive. The core values also include trust in the relationship as an important prerequisite, and one of the respondents stated: "You (the contractor and

supplier) need to trust each other, of course you can do random controls, but you cannot control everything". As a fourth criterion, *willingness for collaboration* was discussed. The respondents expressed a willingness to have a dialog concerning development initiatives as well as the will to invest in development if necessary. Lastly, the *firm characteristics* emerged as an important area of concern. Included in this, respondents mentioned the wide geographical coverage of the firm as compared to the services suppliers who often operate in a local market only. Also the product portfolio was mentioned as an essential criterion to consider as well as the financial situation of the supplier.

Additionally, respondents were asked about the most important criteria for the contractor to live up to. Concerning the relations with the material suppliers, they identified the contractor's primary criteria as *development together with the supplier*. A respondent stated that: "We [the contractor] need to try to understand the situation of the supplier. How we can help the supplier to develop". Other issues raised by respondents were measurement of the supplier performance and recurrent development meetings with the supplier. Respondents stressed the importance of sharing knowledge with the supplier and not being afraid to disclose processes and information in order to facilitate reciprocal development, which was articulated by one of them as: "We need to find the way of working together with the supplier. Then we can get really successful". Secondly, the contractor needs to set *clear specifications* of what the organisation wants when discussing with material suppliers. "Most of the quality issues of today are grounded in that we do not actually know what we are buying", a respondent stated and continued, "If we only buy according to the supplier's technical specifications, instead of developing our own, it is more difficult to measure quality". Included in this criterion is also the part where the contractor needs to stand for what they have said and promised. Third, it was agreed by all respondents that *long-term orientation* of the contractor is essential because the effect of development work takes a while to see. It was stated by one of the respondents that: "It is really difficult to work together with a supplier if you do not think that you have a common future". Although all respondents were united in the need to take a long term perspective, the length of the so called common future varied between the respondents with some arguing for two-year agreements while others argued that agreements should last for at least five years. As the fourth criteria the respondents pointed to the need for the contractor to *guarantee volumes* to its suppliers. In order for the supplier and contractor to evaluate possible effects of development work, there needs to be a guarantee that the contractor will use the supplier. Hence, not only a framework agreement is needed but also a guarantee that the agreement will be used. Lastly, *total cost focus* was discussed. This was preferred to the more traditional price focus and it was pointed out that the contractor should not use its relative power to decrease the margins for the supplier to zero. As one respondent put it: "we (the contractor) shall not kill the suppliers", emphasizing the need for mutuality

in the relationship, and continued: “we do not have any use for the suppliers if they go bankrupt”.

In the last scenario, respondents expressed their views on what the contractor has to live up to concerning service suppliers. The primary criterion that was pointed out concerned *loyalty to framework agreements* with respondents stressing the importance of sticking to the agreements even if the supplier’s competitors are dropping their prices and that it requires professionalism from the individual purchasers to do so. One of the respondents said: “When we have a framework agreement, we need to stick to that. Because that we have promised our supplier”. Second, respondents considered it essential to *follow the agreements* and the terms within them. Hence, criteria directly connected to agreement are in first and second place. Third, respondents emphasised that the contractor needs to give the service suppliers *the right prerequisites* when they are involved in a project because they base their pricing on them. In order for the supplier to be able to plan and forecast, the contractor needs to invite the supplier earlier in the design phase of the project and also strive to keep to the intended schedule since suppliers use it to plan their work. The fourth criterion is *core values*. That personnel are approachable, honest and responsive are considered the most essential values mentioned by respondents. Last but not least, respondents feel that a *long-term orientation* to the collaboration from the contractor’s side is an important criterion in order for the relationship between contractor and supplier to be efficient. One of the respondents concluded that “if we do not treat our suppliers fair, the supplier might get tired of us and this bad reputation might spread, which results in that we are getting difficulties finding a new supplier”.

As all of the 12 respondents defined ten criteria each, a total of 120 criteria were collected of which many were mentioned multiple times. When each criterion was categorised according to the input-throughput-output model, the result was as shown in Table 2; the numbers are divided with respect to whether the criteria concerns what the contractor or the supplier should fulfil.

Table 2. Categorisation of criteria

	Input	Throughput	Output
Contractor	24	29	7
Supplier	31	12	17
Total	55	41	24

5. Discussion and Conclusions

With the purpose to identify criteria for achieving efficient contractor-supplier relations, 12 strategic purchasers within a major contractor in the Swedish construction industry were interviewed. Achieving efficient contractor-supplier relations has been defined as cutting costs and reducing lead times through reciprocal involvement by contractor and supplier in the interface-related value creating processes. The respondents' comments have been categorised based on whether they relate to the input, throughput or output of this process. When summarizing both the criteria concerning supplier and contractor, the most frequently mentioned criteria in each of the categories are shown in Figure 1. However, even if mentioned during the interviews, the criteria categorised as output may not affect the efficiency in the relationship as these are defined as results or potential effects of the relationship.

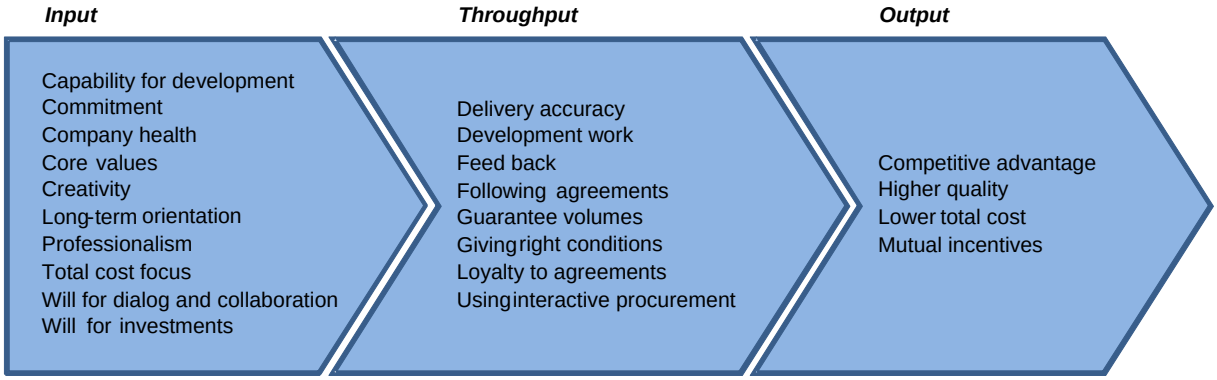

Figure 1. Criteria for achieving efficient contractor-supplier relations

As can be seen from the results, the focus during the interviews was mainly on the input criteria, especially when considering the criteria that suppliers should fulfil. When discussing the contractor's contribution to the relationship, throughput was mentioned the most number of times. A possible reason for this might be that the strategic purchasers that were interviewed are very much involved in throughput activities since working with them all the time, making them easier to come up with, but also because they are easier to grasp. Similarly, potential and desired output of the relationship with a supplier is quite easy to see and define but how this output can be affected by the operative and strategic processes is often tougher for the contractor to realize. As claimed by Rozemeijer (2008), customers need to be in control of their operative processes in order to be perceived as an attractive customer, but in order to do this relevant input to the relationship needs to be in place. It might be an even tougher challenge for the contractor to see the connection to the softer input variables like core values, creativity and commitment and their effect on the efficiency of the contractor-supplier relationship and the corresponding output.

In conclusion, it may not always be possible to increase efficiency in the interface-related value creating processes of the contractor-supplier relationship by just aiming the development and improvement efforts towards these processes; the root cause might instead be related to the input variables as the relationship enablers. This study found that the most eminent enablers are total cost focus, aligned core values as well as the willingness and capability for collaboration and development. It should be noted that respondents made a clear distinction between willingness and capability and stressed that both need to be in place; it is not enough if the organisation has the capability if it does not have the willingness to collaborate and develop, and vice versa. Furthermore, not only the supplier needs to adapt to the contractor and provide the relevant relationship enablers, the contractor also needs to adapt and make an effort in order to be an attractive customer to the supplier, which in some cases seems to be forgotten.

Consequently, improving the input to the relationship may be a way to positively affect the efficiency in the relationship between contractor and supplier. Anyhow, it was once said that Rome was not built in a day, and the same applies to efficient contractor-supplier relationship. Many of the enablers are dependent on continuity in the relationship and therefore it is essential to have a long-term orientation from the buying organisation in order to make it possible to build and strengthen them. Of course a business needs to make short-term profits in order to satisfy external stakeholders and although investments in long-term relationships with suppliers are likely to eventually pay off, it is initially costly and, according to Lafley (2009), a decision that only a contractor's CEO can make. The construction industry appears to be reluctant to embrace the concept of formalised long-term relationships between contractors, and contractors themselves seem hesitant to initiate such arrangements. To help change this situation, the constraints related to establishing and maintaining contractor-supplier relations within the construction industry need to be further investigated and discussed.

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Paper III

Frödell, M. & Josephson, P.-E. (2009) Perceived Constraints when Establishing and Maintaining Contractor-Supplier Relations in Construction. *Working paper, Construction Management, Chalmers University of Technology*.

Perceived Constraints when Establishing and Maintaining Contractor-Supplier Relations in Construction

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Abstract

Contractors purchase material and services for 70-80% of their turnover. In order to increase their competitiveness, contractors need to realise the suppliers' part in the delivery and prioritise the value created by the suppliers. Even though, construction companies often are recommended to emulate manufacturing companies when developing long-term relations with their suppliers, there are, however, constraints for this development which are related to the characteristics construction industry. The aim of this paper is to identify perceived constraints related to establishing and maintaining efficient contractor-supplier relations in construction. The findings are based on a two-year case study of a large contractor, where field observations and in-depth interviews were carried out in order to find out what individuals working in a purchasing department perceive as being the constraints. The results show that most of the perceived constraints reported seem to concern the contractors' organisations and behaviour. It is recommended that the contractors initially focus on developing a robust organisational foundation before focusing on the development of relationships with suppliers. It is further recommended to differentiate the strategy for developing supplier relations depending on characteristics such as type of product and geographical markets. Some suppliers are suitable for closer collaboration on a national level, whereas, in some categories of products, it is more suitable to strengthen regional networks of suppliers.

Introduction

Manufacturing companies tend to build long-term relations with the suppliers they consider to be most important, and then work to develop a viable mutual process in order to strengthen the relationship. Successful manufacturing companies may even support their suppliers' development believing that the cost will be lower if also the suppliers work more efficiently. These manufacturing companies believe that their competitiveness is dependent on both the efficiency in their own processes as well as those of their suppliers. When looking at contractors within construction, this behaviour is not seen to the same extent (Saad et al., 2002). Why is that? Do the market conditions, the industry structure and the organisational culture hinder construction firms from following the same behaviour?

Manufacturing companies are described as producing longer series of fewer products in permanent factories and as having more or less permanent processes and organisations. Construction companies are, on the other hand, described as producing single and unique products in temporary factories and where organisations are constantly renewed. Is it a better strategy to avoid establishing long-term relations and instead focus on forming structures and training the employees to be flexible? Does type of product matter?

There are several reasons for examining constraints that undermine the establishment and maintaining of contractor-supplier relations in construction. First, contractors purchase material and services for 70-80% of their turnover. In order to increase their competitiveness they need to prioritise the value created by the suppliers and realise the suppliers' part in the delivery. Hence, suppliers form large part of the quality that the contractors deliver (e.g. Proverbs and Holt, 2000; Karim et al., 2006). Second, contractors invest resources to establish closer and long-term relations with their customers while they ignore establishing long-term relations with their suppliers (Josephson et al., 2009). Third, a construction project involves several relations between firms. Projects that initiate new relations between firms increase the uncertainty and the risks. Long-term relations could decrease the uncertainty and the risks. Moreover, research within construction has so far focused on relationships between contractor and client and ignored the relationship between contractor and supplier (Saad et al., 2002; Akintoye et al., 2000).

The aim of this paper is to identify perceived constraints related to establishing and maintaining contractor-supplier relations in construction. During two years, the first author was employed within the purchasing department, which is a national staff that manages framework agreement suppliers. The purchasing department manages the sourcing and implementation of these agreements, while the actual purchases are done locally in each specific project. Participatory observations together with individual interviews constitute the primary method of data collection. In total, 37 in-depth interviews were conducted of which 25 focused on a specific contractor-supplier relation (see Frödell and Josephson, 2008) and 12 of the respondents belonged to the purchasing department (see Frödell, 2009). The participative observations lasted for a period of two years where the first author's role as an observer was subordinated the role of participant and hence, could be termed participant-as-observer (Gold, 1958; Merriam, 2009). The observations were continuously documented by writing field notes (Bryman and Bell, 2007), where a special focus was on opinions and comments related to the case organisation's perception of constraints regarding establishing and maintaining of contractor-supplier relations.

Based on the field notes, a categorisation of the perceived constraints was made. The aim of this paper is not to give an exhaustive coverage of constraints related to the establishment and maintaining of contractor-supplier relations, but to report topics which were frequently mentioned and discussed within the case organisation. Eight perceived constraints concerning establishing and maintaining long-term supplier relations form the basis of this paper. Four major areas related to perceived constraints have become clear: Contractors' organisational structure, Contractors' long-term/short-term perspective, The business deal and The external environment. Each of the major areas is constituted by two perceived constraints, resulting in eight perceived constraints which are discussed below. After the field notes had been analysed and a preliminary categorisation of the perceived constraints were formed, a group discussion with two strategic purchasers from the case organisation was held in order to get additional information on the perceived constraints. The group interview lasted for three hours and was led by both authors. During the discussion, each identified perceived constraint was introduced by the authors and followed by a discussion. The discussion was audio recorded.

Contractors' organisational structure

The contractors' organisational structures have significant influences on their behaviour. Since Sweden is a long country with a long distance from north to south and the large contractors do business in a variety of sub-industries, the contractors have divided their organisations into several regions and further into several districts. In addition, new projects are often located in new places. The organisations are decentralised and the work is performed in different ways in the different projects.

1. Contractors' decentralised organization

The first perceived constraint relates to the decentralised organisational structure implemented in the contractors' organisations. Generally, decentralised organisations are argued to have fast and adaptive decision paths which can be seen in the cases of this paper as well. An effect of this, however, is that many decisions are made locally in the organisation and have a tendency to see to the good of the project rather than the good of the organisation as a whole. This sub-optimization is an inherent part of the culture which was clearly articulated by one of the strategic purchasers: "the local decisions are sub-optimized is matter of course".

The effects of this decision-making pattern can be seen in purchasing and supplier relations. Even if the purchasing department signs the framework agreements with suppliers, the projects make the actual decision of what supplier to use. A strategic purchaser emphasised the subordinate status of the framework agreement and the power of the order itself: "The framework agreements may be good for our suppliers but in the end it is the actual order that matters, that is when they can secure their money at the bank. A non-binding agreement is more a case of nice to have." This does in fact result in the framework agreements being mainly used when considered the most favourable from a project perspective. From a supplier perspective this might be seen as a need to promote their products twice, once to the purchasing organisation for the signing of agreement and once to the project for the actual order.

Even though loyalty to the current agreements can be considered high within the case organisation, the reasons for this can be questioned. The fact is that many of the suppliers were already widely used through the organisation even before the agreements were signed, which unambiguously lead to a high loyalty to the agreement. However, it is questionable if the loyalty would be as high if the supplier were changed in favour of a new one; or would the projects still buy from the former supplier?

It is then obvious to ponder the actual benefits the suppliers gain from these framework agreements if the contractor only follows them when it is the most favourable for themselves and their specific project. Furthermore it may not be completely clear who should decide when to follow the agreements and when not to. Is the decision for the purchasing department which has signed the agreements and which are supposed to have the best holistic picture of the market, or it is for the projects which mainly are working to maximise the results for the specific project and are mostly updated on the current preferences and the actual needs in the production?

2. Different ways of working in the contractors' projects

The second perceived constraint relates to the contractor's organisation and concerns the different ways of working in the projects. The major contractors carry out thousands of projects each year spread both geographically and in content. In these projects, the ways of working are very individual and relate to the specific site manager rather than to the company which the site manager is a part of. Hence, when the supplier is approaching the projects there are different ways in how the projects thinks the ordering and delivery should be conducted making the situation for the supplier very difficult. One part of the development of contractor-supplier relations relates to standardised ordering from the projects and standardised deliveries from the suppliers which has turned out to be a very difficult task for the contractors, and the suppliers use their own ways of dealing with this matter.

One way for the suppliers to manage the inconsistency in the projects' ways of working has turned out to be differentiated prices. A strategic purchaser explained: "There are sub-contractors [service suppliers] that offer a certain price if a specific project manager is responsible for the project. This is because they know that it will be a better functioning process". Another strategic purchaser points out that this should not be seen as a rebate when there is a good project manager, i.e. a manager that runs projects in structured ways and follows the original schedule, but as an additional cost for extra work and for higher risks when the project manager is not as good. Consequently, suppliers put great value in a consistent and well managed process within the project.

When treating the issue of supplier relations and supplier development, it is questionable if the contractors are mature enough to deal with the suppliers' processes when they do not have control over their own situation and their own processes. A better support in these matters might be needed from other parts of the organisation. "The production should focus on developing what they are best at, the production. But they also need support with issues as structural calculations, processes and purchasing", a strategic purchaser stated, further elucidating the situation. Nonetheless, purchasing is considered a good and concrete way to realise cost reductions for the project. A production manager stated that "purchasing is the only post where we can make a profit. All other costs are pretty much fixed."

Contractors' long-term/short-term perspective

On the strategic level, decisions are supposed to be based on a long-term view. The decisions on the operational level are, on the other hand, based on short-term views. One reason is that the business to a high extent is organized for maximum profit in single projects.

3. Contractors' short-term approach

Moving on to the contractor's short-term and long-term perspective, the third perceived constraint concerns the contractor's short-term approach. Even though it is generally accepted that long-term thinking is favourable for reducing transaction costs and increasing productivity, measurements and incentives systems still drive the organisation to take a short-term perspective when it comes to supplier relations. For instance, one of the strategic

purchasers within the case organisation stated that he could sign better deals with the suppliers, but since the evaluations of the purchasers and the incentive structures were based on reducing prices each year, the most favourable deal for the company in a long-term perspective is not always the one chosen.

That the measures and incentives systems encourage decreased prices each year must be seen as a major indicator of the contractor's short-term approach since most mutual investments and initiatives of the contractor and supplier might take at least a couple of years to pay off. The incentives systems, however, indicate what the management sees as important and which criteria they wish to aim towards, which was supported during a group discussion through the statement: "What I have to do in order to get my bonus definitely drives my work".

The construction industry has already started to build long-term relations between the actors and also identified the benefits. This is, however, only done in the relations between clients and contractors. Even if it is quite easy to show the positive effects of a long-term relationship with a client, both for the client and for the contractor in terms of money, it is more difficult to show in the relationship between contractor and supplier.

"At the end of the day, it is money into the projects that matters" a strategic purchaser stated. While financial results are the main driver within the production management, it is hard to believe that the focus on the price might diminish in favour of total relationship costs. Who would be willing to take the initial cost of an investment in a supplier if the revenues cannot be seen within the time frame of the project, or not even in the coming year? The contractor who takes on this kind of reciprocal investments would have a strong competitive edge compared with competitors.

4. Organisations' lack of maturity for long-term relations

The fourth perceived constraint is the organisation's maturity for long-term relations. In the literature it is argued that supplier development and long-term relations with suppliers need an exhaustive set of antecedents and proper organisational founding in order to lead to the positive effects so often mentioned (Trent and Monczka, 1999). As a first step supplier base optimisation is mentioned; it is explicitly stated that closer interaction between the organisations is not feasible with a large supply base (Trent and Monczka, 1999).

The supply base of the case organisation constitutes approximately 28,000 suppliers annually. Of course the number is dependent on which exact definition of a supplier is used, but according to internal figures this is how many suppliers have invoiced the organisation during one year. During 2007, 0.13 percent of the suppliers corresponded to more than 25 percent of the case organisation's purchased volume and 10.26 percent of the supplier delivered 90 percent of the value as shown in Figure 1. Hence, over 25,000 suppliers could be eliminated and the purchasing volumes would not be more than slightly affected. Of course it is not as simple as that because several of the supplier markets are local and the production is often dependent on certain specialists, but since almost 9,000 of these suppliers only sent one invoice and almost 17,500 suppliers sent five invoices or less during 2007 something could most probably be done.

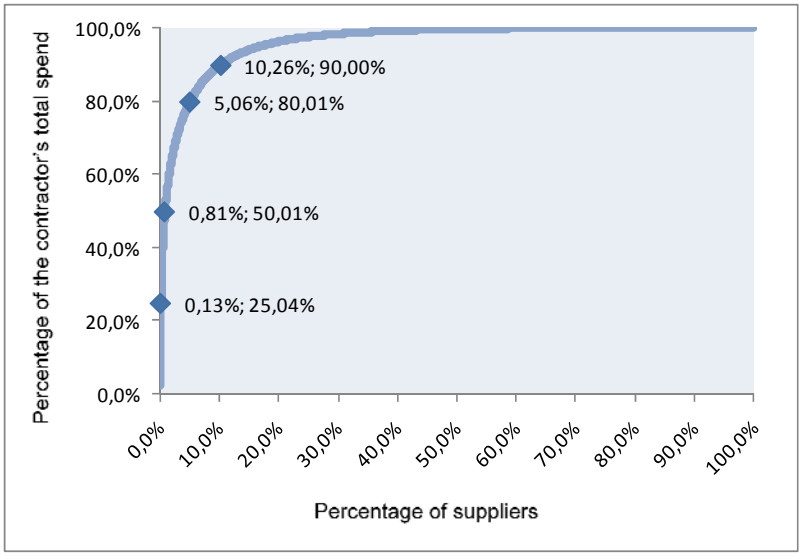

Figure 1. Percentage of the case organisation's suppliers representing part of total purchased volume

The business deal

There are also a number of perceived constraints that contractors face when they come closer to the purchasing situation. Here, we discuss the power balance between contractors and suppliers and contractors' weak planning, leading to the situation that they do not know what they want to purchase.

5. Uneven power balance between contractors and suppliers

The fifth perceived constraint concerns the power balance between the contractor and the supplier which is an often mentioned influential factor when discussing buyer-supplier relations.

One aspect of power balance is related to demand and supply, i.e. the customer has more power when the supply is bigger than the demand and vice versa. Another aspect of power balance is related to the customer's and the supplier's sizes. A common situation is that the contractor is far bigger than the supplier. A third aspect, which is discussed here, concerns how much the supplier depends on a single customer, i.e. percent of total sales volume.

When looking at the fifteen largest suppliers of the case organisation it becomes evident that the majority of these suppliers deliver less than ten percent of their turnover to the contractor, as shown in Table 1. The table represents the case organisation's purchasing from a specific supplier as part of the suppliers' turnover and if the supplying organisation is international, the numbers show the turnover of the Swedish subsidiary. With this

Table 1. The case organisation's purchasing to the specific supplier as part of the suppliers' turnover

Internal wholesaler	99%
Internal material supplier	84%
Material supplier	49%
Internal service supplier	45%
Internal service supplier	38%
Material supplier	20%
Material supplier	9%
Material supplier	6%
Service supplier	5%
Service supplier	4%
Wholesaler	4%
Wholesaler	3%
Service supplier	2%
Wholesaler	1%
Material supplier	1%

relatively small impact on the supplier it could be questioned whether the supplier is interested in engaging in long-term relations with a specific contractor.

It is, however, important to see whether the buyer is one of the largest buyers for the supplier. That could make the buyer important even though the part of the turnover is minor. Furthermore, the construction industry in some cases comprises a special segment within the supplier's organisation which would make it even more interesting for the supplier to establish long-term relations. It is, however, evident that few of the case organisation's major suppliers are dependent on the contractor for their survival: "this certainly does not increase the possibilities for developing mutual processes", one strategic purchaser stated.

6. Contractors do not know what they want to purchase

The sixth perceived constraint is the issue of contractors not knowing what they are buying; at least not until it is too late. Generally it is argued that a prerequisite for purchasing is that what is going to be bought is specified. Yet, several examples to the contrary have been seen. Specifications are not really scrutinised until problems occur. As an additional effect, the bargaining power might decrease if the possible range of alterations in the products is narrowed down by requisites and prescriptions above what actually is needed for a satisfactory functionality.

An actor with a major impact on this issue is the clients since they in many cases prescribe the parts of the construction object. The client (and the architect) prescribes specific material produced by a specific supplier and according to their product range. "We need a functional specification instead of just a brand and a model", a strategic purchaser stated and emphasised that many alternatives to the well-known and sometimes preferred brand might be as good and might also come at a lower cost. Instead, as an effect of the client's prescriptions, the contractor has to purchase from the suppliers' ordinary product range rather than specifying what is actually needed.

This issue further affects the possibilities of building long-term relations with suppliers since it is not always possible for the contractor to choose the supplier. "This could be changed if we want to", one strategic purchaser stated and primarily addressed the projects which are developed in-house. It was, however, emphasised that the costs for setting the specifications might be high and that some sort of standardisation of purchased good preferably should precede these efforts.

External environment

A current strategy for large contractors is to establish long-term contracts with prioritised suppliers at firm level. The strategy is simple to carry out when the market is ideal. However, the construction market changes over time and only a few suppliers, especially service suppliers, do business in all regions within Sweden.

7. Contractors and suppliers work on different geographical markets

There are regional, national and global contractors. The case company is a national based subsidiary of a global company. They do business in all regions within Sweden. An ideal situation is, of course, to develop long-term relations with suppliers that also do business in all regions. There are, however, few suppliers that fulfil that criterion. The vast majority of suppliers are local, especially service suppliers.

Take HVAC installation for example, which is one of the major subsectors. There are approximately 3000 firms registered in Sweden. Only three of them, Bravida, NVS Installation and YIT operate nationally, i.e. they do business in the same regions that the case organisation does. A few other firms operate in several, but not all, regions. All other firms operate locally. This situation is similar in most subsectors.

If the criterion for choosing suppliers was based on the fact that they do business on the same geographical markets as the contractor, only a very few firms in every subsector would be qualified. Such a limited number would reduce the possibilities to find the supplier that is most suitable for developing closer collaboration. When it comes to specialist contractors, for example HVAC installation firms, it should be noticed that they are decentralized in a similar way as large contractors.

With this situation in mind large contractors should consider other strategies. One general strategy could be to choose suppliers that are willing to expand into new geographical markets and support these suppliers expansion. Another general strategy could be to develop long-term relations on regional levels instead of national level.

8. Great market changes over time

Construction is characterised by major market changes on a national level over time. The changes on a regional level are even greater.

The situation of constant market changes leads to a question of supply and demand on a short-term basis. When the demand is higher than the supply, the contractor has to negotiate with more suppliers while the suppliers are less interested in delivering to a specific contractor. When the supply is higher than the demand, the supplier has to negotiate with more contractors, while the contractor may be less interested to purchase from a specific supplier. The best opportunity to establish and maintain efficient contractor-supplier relations occurs when supply and demand are balanced. Supply and demand are, however, never in complete balance. The market is never perfect.

Neither the contractor, nor its suppliers seem to be interested in prioritising a single supplier or contractor, partly due to the great market changes. A strategic purchaser mentioned how the contractor, in time of prosperity, had to buy a certain product from all suppliers active in the Gothenburg region. In contrast, when the market fell in 2008/2009, the top management gave strong recommendations to the suppliers to reduce prices in order to maintain their

framework agreements. Furthermore, during the recession, project managers themselves negotiated with suppliers that the case organisation already had framework agreements with in order to get lower prices than those already accepted by both parts.

Discussion and conclusions

There is an ongoing debate on how construction could develop more efficient processes, leading to higher customer value (e.g. Byggkommissionen, 2002; Statskontoret, 2009). One common recommendation is to establish long-term customer-supplier relations (e.g. Dainty et al., 2001), but it is also questioned as a general solution (Fernie and Thorpe, 2007). On this issue, this paper takes a contractor perspective. Contractors tend to focus on establishing closer relations with clients, i.e. their customers, but tend to neglect their suppliers. This paper is based on a case study of one of three large private owned contractors in Sweden. However, the results are relevant for most large and medium-sized contractors.

Eight perceived constraints concerning establishing and maintaining contractor-supplier relations have been identified. Two common denominators of the perceived constraints concern the need for contractors' to take responsibility and the differentiation in approaches towards suppliers.

It is apparent that most of the perceived constraints reported here concern the contractors' organisations and behaviour. This might be because the case study was conducted within a contractor organisation and hence, the identified focused on this organisation. Still, contractors play a major role in many of the perceived constraints and, if these constraints are to be surmounted, the responsibility is with the contractors. Trent and Monczka (1999), argued for the importance of proper organisational foundation before focusing on the development of relationships with suppliers. For instance, they accentuated the need for an adapted organisational structure, measurement and evaluation systems as well as human resource development. These are issues which have also been found to be crucial in this paper, why contractors should focus on their structure and the behaviour holistically in the organisation. Van Weele (2005), however, argued that the organisational structure in many companies of today makes achieving close and effective cooperation with suppliers a difficult process. In order to manage this change in perspective, there is a need for a cultural change within contractor organisations where long-term thinking in the relationships with suppliers permeates the entire organisation.

Furthermore, the large numbers of suppliers delivering products to the contractors' organisations have different characteristics. For instance, there are differences in size, geographic coverage and type of delivered product. The contractors should therefore differentiate their approaches towards their suppliers, adapting them for the specific supplier and the situation (Fernie and Thorpe, 2007). Some suppliers are suitable for closer collaboration on a national level, whereas in some categories of products it is more suitable to strengthen regional networks of suppliers. Consequently, one recommendation is that the contractor should focus on developing closer collaboration with a small number of suppliers

(Errasti et al., 2007; Sarkar and Mohapatra, 2006) and thoroughly consider the decision of which suppliers to approach.

By aiming specific development efforts at the relationships that are most suitable, it is possible to realise the potential of long-term relations and also highlight the good examples which result from these initial efforts. These long-term relationships are not necessarily best suited for the major national – or even global – suppliers, but might instead be more likely to succeed if the efforts are aimed at suppliers which are more dependent on the contractor as customer.

Even though the general debate within the construction industry promotes the need for increased productivity, contractors of today are not forced to extensively cut costs since yearly increases in price are more or less an inherent part of the business. This could be an issue for the clients that have a high potential of increased gain by taking greater account of the contractors' relations to their suppliers. Since over 70 percent of the money that the client is paying the contractor is passed forward to the next tier of actors, it could be seen as an obvious step for the client to extend the relationships further than to only the contractor. The partnering contracts should in this case reach a greater part of the value chain than it does currently.

Nevertheless, this is foremost an issue for the contractors who could realise a potential gain by developing their relations to their suppliers and also their processes in the interface towards the suppliers. To conclude, contractors have a long journey to travel before fully adapting supplier relationship management, and the development has to be taken in small steps in order to manage to increase the performance of the supply chain.

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