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.
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, 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 one 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 fulfill 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.

REFERENCES


