Barriers to productive supplier involvement in joint product development

Keywords: Supplier involvement, supplier perspective, joint product development

Abstract

What are the conditions that hinder supplier involvement in generating supplier value during product development? The results of six case studies of product development activities in the mechanical engineering industry show that conditions such as customer power advantage, remote location relative to that of the customer and frequent changes in the customer's purchasing personnel are unfavourable for suppliers with respect to their ability to benefit from involvement in the customer's product development. This study contributes to joint product development literature from the small-and-medium size company perspective by showing that smaller suppliers should recognise and take into account these conditions when deciding the extent to which they will invest in their customer's product development.

Introduction

Previous research has shed light on supplier involvement in product development (Johnsen, 2009). Most of the previous studies have focused on the customer perspective and have contributed to supply chain management practices. Supplier involvement has been found to enhance the customer firm's product quality, shorten the product development time and reduce product costs (e.g., Ragatz, Handfield and Petersen, 2002). However, studies conducted from the supplier perspective are rather few, and they show mixed results with respect to the benefits for the supplier (Stjernström and Bengtsson, 2004).

Building on the resource-based view, the present study defines supplier involvement in an effort to contribute to customer's product development but also to create direct and/or indirect value for the supplier. This definition sets out a requirement for the supplier's core capabilities created as a combination of resources and processes (Long and Vickers-Koch, 1995). Resource combination may include, for example, manufacturing knowledge, engineering skills, interaction capability, customer knowledge and social capital. Typically, these core capabilities are path-dependent, are obtained in unique historical conditions and include socially complex elements, making core capability imperfectly imitable.

In some cases, customers expect suppliers to take responsibility for value creation and to deliver more complete systems or solutions than in the past. The growing importance of these system suppliers, the increasing complexity of these supplier-customer relationships and the growing information asymmetries between suppliers and customers require customers to involve these suppliers in their product development and require an increase in information sharing between the customer and supplier companies. Supplier involvement is an investment, and sometimes a policy decision, for the customer, but to participate in product development is an even bigger investment for a small supplier. Prior studies have argued that suppliers often participate without charging the cost directly to the customer and instead trust that collaboration will eventually generate earnings (Chung and Kim, 2003). In addition to direct earnings, suppliers seek to increase revenue flows, decrease negotiation pressures, increase revenue stability and gain reputation value (Ramsay and Wagner, 2009). Thus, to benefit from participation in a customer's product development, suppliers need to understand the conditions that obstruct the realisation of possible benefits. This study set out to determine which factors prevent suppliers

from creating value for themselves when they are involved in the customer's product development and how this value is created.

The article is organised as follows: a theoretical background is presented after the introduction; the theory section begins with an examination of the supplier involvement concept in product development; the analysis then continues with the supplier value research, which addresses some major points from a supplier's perspective; the methods section summarises the research design and methodology and is followed by the analysis of the cases; finally, the findings are discussed, and conclusions and implications are drawn.

Theoretical framework

Supplier involvement in product development

The need to involve suppliers in product development has evolved from the modern organisation of work, in which a large percentage of the production is outsourced to other manufacturing companies. Suppliers have developed superior skills for manufacturing the outsourced components, and thus they have unique knowledge concerning the product. This consideration, together with the growing complexity of the products, has led to the systematic involvement of suppliers in product development. The previous research on supplier involvement has mainly been focused on the customer perspective. This research can be traced back to the work of Takeuchi and Nonaka (1986). They suggested that supplier involvement was a major explanation for the superior performance of Japanese companies. Clark (1989) continued this supplier-involvement research by comparing Japanese, US, and European car manufacturers. He found that the Japanese practice of involving suppliers in car development, particularly through the use of black-box parts, led to shorter lead times and to a more efficient development process. In addition to the car industry, supplier involvement has also been found to have positive effects on product and process development in other industries (e.g., the food industry) (Bonaccorsi and Lipparini, 1994). Ragatz, Handfield and Scannell (1997) shed light on the development of supplier integration as a prerequisite of successful supplier involvement. They found that certain practises were more common in successful product development supplier integration efforts than in less successful ones. Those practises included supplier participation in customer company's project team, direct cross-functional intercompany communication, shared education and training, common and linked information systems and co-location of the buyer/seller personnel.

The significance of developing supplier relationships has raised questions about the suppliers' perspective. While the mainstream of the supplier involvement literature has remained focused on the customer perspective, some contributions have been made from the suppliers' side. One of these is Walter's study (2003) of 247 German supplier companies. He examined the role of personnel integration in supplier involvement and found that "relationship promoters" within the customer companies play an important role in developing trust and commitment. Relationship promoters are managers within the customer company who are committed to making the relationship work based on their good personal relationship with supplier company (Walter 1999). Chung and Kim (2003) researched 128 suppliers in the Korean automobile and electronics industries. They found that higher levels of supplier involvement significantly increase the suppliers' innovation and cash flow. However, the quality improvement was apparent only in the electronics industry. Another contribution to the suppliers' perspective is the study by Stjernström and Bengtsson (2004). They described supplier involvement experiences in six Swedish supplier companies. They found that suppliers felt they were capable of more extensive involvement than they were achieving in practice. They also

identified four barriers to collaboration in product development. These barriers included customer demands for price reductions, undefined expectations from customers, asymmetrical dependence on the other party in a relationship and restrictions on collaboration with customer's competitors.

Supplier value

The benefits mentioned in the previous section are the basis for many types of values that, in the end, are shared between supplier and customer. Values can be categorised into four groups: direct supplier values, indirect supplier values, direct customer values and indirect customer values (Fig. 1). Direct values are values that directly affect performance. These values include enhanced profit, increased sales and certainty in relationships. Indirect values are potential benefits that can be capitalised within a longer period of time in the same relationship or in another business relationship. Indirect values include innovation, market and technology knowledge and access to new markets through the other party in a supplier-customer relationship. This classification is consistent with one used in Purchase, Goh and Dooley's (2009) research.

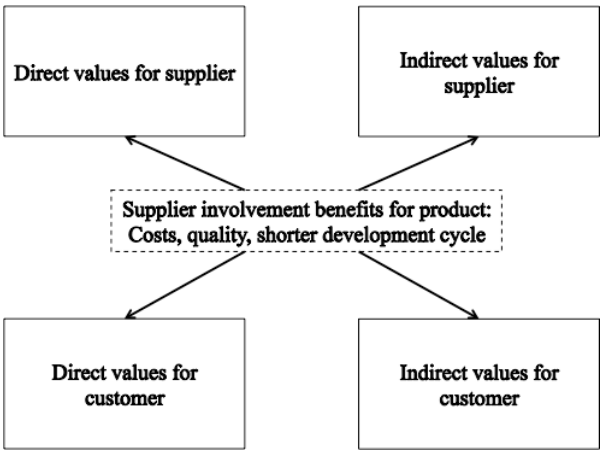

Figure 1. Distribution of the value created through supplier involvement.

Each product development step in supplier involvement creates a portion of the value to be shared between the supplier and the customer. To secure motivation and operational preconditions for the future, the value must be shared so that both parties are satisfied (Swink and Mabert 2000). This study focuses on the supplier side and on the factors that obstruct suppliers from obtaining value.

Method and case studies

This study analysed suppliers' experiences with involvement in their customer's product development processes. The study is explanatory and descriptive in nature. The analysis is based on multisite case studies that focus on six product development projects in the Finnish mechanical engineering industry. Analysed projects took place in two small supplier companies. Each case was examined using key informant interviews. In every product development project under consideration, the supplier was able to increase product quality, enhance the manufacturability of the product and/or reduce product cost. However, the benefits to the supplier remain uncertain. Next table summarizes the results from each case.

Case	The supplier's main expectations of SI	Benefits achieved for the supplier	Obstructing factors, as stated by the key informant
PDP1	To be able to increase sales by developing a new product with enhanced design and lower costs.	A better reputation within the customer company and potential sales increases in the near future.	The limited possibility of contributing to the selection of the used components in the product, which affected the delivery time and delivery reliability.
PDP2	To gain part of the customer's production for itself and thereby generate steady revenues.	Occasional sales and the ability to supply this product to other customers.	Changes in the customer's organisation; the customer found another way to produce the shelters at its subsidiary site.
PDP3	A steadily growing customer relationship.	Occasional sales and expertise in international co-development.	The remote location relative to that of the customer and cultural differences.
PDP4	To reach a new level of sales with the customer.	An initially steady revenue from the customer that has started to decline and owning the product.	The lack of social capital due to changes in the customer's purchasing organisation, differing targets among customer's purchasing teams and product development teams.
PDP5	Growth in revenue flow from the customer by enhancing the competitive advantage of the end product.	Growth in sales for the customer.	A possible lack of project-development motivation due to the totally secure customer relationship.
PDP6	To secure its position among the suppliers.	Temporary growth in market share among the suppliers.	The customer's policy of using multiple suppliers and a long period without development after the original project.

Table 1. The expectations, benefits achieved and obstructing factors in the cases.

Analysis and discussion

The aim of this research was to explore and describe suppliers' experiences of involvement in their customers' product development and to particularly identify and analyse the conditions that obstruct supplier involvement and reduce supplier value during product development. Suppliers typically have path dependent and socially complex resources, such as machinery, manufacturing knowledge, engineering skills, interaction capability, customer knowledge, purchasing networks and social capital. Supplier involvement can be seen as a core capability for the supplier when it successfully combines capabilities that use the above-mentioned resources. This core capability should generate value to the supplier. In theory, the complexity of the combination should increase the sustainability of the competitive advantage so obtained (Barney 1991). For these cases, however, there were conditions that partially prevented the supplier from creating value through supplier involvement.

Changes in the customer's organisation led in some cases to a loss of valuable social capital on the part of the supplier. This loss was particularly evident for PDP4. The supplier sees that its weaker connections to the customer's purchasing organisation lead to situations in which it is not able to practice totally open communication with the customer's R&D personnel. By contrast, communications between the supplier and customer in PDP1 and PDP5 were characterised by a high level of trust, and the suppliers were able to benefit more from the development project. Change in the work organisation of the customer company is a risk for the supplier. In PDP2, the supplier's development work did not lead to the expected results as the customer changed its plans and moved the manufacturing to its subsidiary. The customer's advantage in power and the policy of using multiple suppliers does lead to temporary benefits for supplier. This situation was the case in PDP6. In cases of black-box development, keeping the same supplier and motivating them or engaging in network development with several competing suppliers (Thorgren, Wincent and Örtqvist 2009) may be a better option than beginning with a new supplier. In contrast to the above-mentioned cases, the completely secure relationship with the customer in PDP5 can be seen as a potentially obstructing condition for supplier involvement.

Proposition 1. *Instability in the relationship slows down supplier involvement and hinders the supplier from creating long-term value through it.*

The supplier's remote location relative to that of the customer was a hindrance in PDP3. The supplier believed that the location and cultural differences limited the communication between the companies and hence decreased the efficiency of the supplier's involvement. The supplier also believed that its remote customer was exposed to competition from nearby suppliers.

Proposition 2. *Physical and cultural distance may prevent the supplier's capitalization of the involvement.*

The cases demonstrate that instead of direct benefits, suppliers may gain more significant indirect benefits. In PDP4 and PDP2, a new product was generated for the suppliers' product portfolio. In these projects, the collaboration with customer reduced the risks of the explorative product development. The suppliers were able to reduce the risks compared to a totally independent product development project, as they had a customer for the product already available. Moreover, the customer's assistance with the product requirements and specifications directed the product development in a market-oriented way. Thus, the indirect benefits were manifested by increased supplier knowledge.

Proposition 3. *Instead of the expected direct, short-term benefits, the benefits for supplier may be indirect and more remote in time. The indirect benefits include increased knowledge, learning-by-doing, enhanced reputation and reduced risks.*

Conclusions

Several conditions that hinder supplier value creation through supplier involvement can be identified from these cases. First, frequent changes in a customer's purchasing organisation prevent a supplier from building up its reputation and from creating personal connections within the customer's organisation. A supplier may be able to address this problem by promoting its past achievements in supplier involvement and by building ties to other parts of the customer organisation, such as engineering or supply chain management. A supplier can also focus on developing a relationship with a specific relationship promoter (Walter, 1999) within the customer's organisation. Second, great physical distance and cultural differences may prevent frequent and natural communication. This impediment may in turn affect the support for supplier-led innovation, the efficiency of supplier involvement in general and the direct outcomes from supplier involvement. Third, completely secure and stabile buyer-supplier relationships may lead to a lack of motivation to introduce radically new ideas for a customer's product. In the long run, this lack of innovation may lead the customer to search for relationships with other more innovative suppliers. Fourth, the customer power advantage and a customer's policy of using multiple suppliers may prevent the supplier from benefiting from its product development efforts. A powerful customer may prevent the creation of supplier value by sharing the developed design with other suppliers, by using the developed design within its own production or by demanding that it receive all the cost benefits that are achieved. Fifth, a lack of uniqueness in the supplier's combination of resources reduces customer dependency after the design process is complete and may lead the customer to apply a transactional relationship. If the supplier's resource combination has unique elements, the supplier may be able to direct the product development project towards applying its resources to production.
The above-mentioned conditions and solutions have to be carefully considered in situations where a supplier is investing in its customer's product development. A supplier should analyse the value that it will obtain through involvement in a wide setting to determine the full meaning

of its product development efforts.

Limitations

Some limitations in the findings of this study must be considered. First, there is a trade-off between the insights gained from case studies of particular circumstances and the generalisability of the results. Second, the complexity of the product development task was not the same for all of the cases studied. However, a range of issues joined the cases and made them comparable. For example, they reflected a common technological context, as all of the development projects were concerned with sheet metal production. Third, although the focus on the mechanical engineering industry allows a better understanding of the study context, it also limits the generalisability of the results beyond this context. Therefore, it would be beneficial to study the factors preventing suppliers from creating value for themselves in other industries. Despite these limitations, this study sheds initial light on our understanding of what obstructs suppliers from achieving value through supplier involvement in product development.

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