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Supplier selection or collaboration?

Determining factors of performance improvement when

outsourcing manufacturing

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6943 words exclusive of abstract, references and tables

Abstract

An empirical study was designed to determine factors of performance improvement when outsourcing manufacturing. Findings from a survey of 136 manufacturing plants in Sweden show that most of them achieve their outsourcing motives, but not without trade-offs. Factors of performance improvements such as economies of scale or operations in low-cost countries can improve one performance dimension, such as product cost, yet negatively impact volume flexibility, speed or product innovation. The results show part characteristics and supplier operating capabilities are more important than supplier relationship strategies when outsourcing manufacturing, meaning that supplier selection trumps supplier collaboration in the make-or-buy decision.

Keywords: outsourcing strategy; performance trade-offs; performance improvement; supply chain management

1. Introduction

The practice of outsourcing continues to challenge managers. Although the theoretical foundations for outsourcing manufacturing are firmly rooted in the literature, it seems to be difficult for many practitioners to fully take advantage of this practice in reality. There

are several examples of outsourcing initiatives that have failed to achieve a company's performance objectives. A recent case in point is Chrysler's lawsuit against Accenture for not delivering the promised savings when obtaining new suppliers in low-cost countries (Sherefkin & Barkholz, 2008).

The purpose of this study is to improve the make-or-buy decision process for managers by providing empirical evidence on what factors really matter in attaining various kinds of performance objectives. The study fills a gap in the purchasing and supply management literature by involving several make-or-buy decision factors and simultaneously assessing their performance improvement impact. As will be shown, most conceptual make-or-buy frameworks involve many factors, while previous empirical studies have handled each of these factors only in isolation.

1.1 Previous studies with a wide approach

Previous empirical studies on outsourcing practice and performance relationships can be divided into two main strands of research, wide and narrow studies. Both aim at predicting plant performance. However, the studies that take a wider approach investigate outsourcing in relation to other manufacturing practices, such as investments in advanced manufacturing technology. In summary, the wide-focus studies show that practices other than outsourcing that enhance manufacturing capability have a much stronger ability to predict improvements in operating performance. While investments in higher manufacturing capability have only positive effects, outsourcing manufacturing may entail negative as well as positive effects on operating performance. For the most part,

outsourcing leads to negative effects when used as the main strategy to improve performance, but is more likely to cause positive effects if concurrent initiatives are taken to develop manufacturing capabilities. Thus it is argued that there is far greater performance improvement potential in investing in, rather than divesting, the manufacturing function. Outsourcing is mainly beneficial when used to free resources in order to invest in higher manufacturing capability.

The first type of wider approach study is survey research, which studies outsourcing in relation to other manufacturing practices. Mixed results have been found. While the work of Laugen, Acur, Boer, and Frick (2005) and Pagell and Sheu (2001) found either no effects or very weak but positive effects of outsourcing, the work of Leachman, Pegels, and Shin (2005) and Dabhilkar and Bengtsson (2008) for the most part found a negative performance effect. However, all four studies found very strong performance effects regarding the other manufacturing practices. Laugen et al. (2005) for example, whose investigation emphasised best practices, found that the streamlining of production flows, JIT, and TPM, etc., were examples of best practices, while outsourcing was not. Pagell and Sheu (2001) found “buyer behaviours directly manifest in supplier performance and only indirectly manifest in their own performance. This can give the buyer the false impression that the supply base is harming performance, when the real problem is the way the buyer manages the supply chain” (Abstract). Leachman et al. (2005) found that R&D commitment and the ability to compress production time have a strong positive impact on manufacturing performance. Finally, Dabhilkar and Bengtsson (2008) showed that in comparison to outsourcing, practices related to the enhancement of manufacturing

capability had a much stronger ability to predict improvements in operating performance. In addition, the study showed that outsourcing is mainly beneficial when used to free resources in order to invest in higher manufacturing capability.

It is important to note how outsourcing was measured in these studies. Three of them (Laugen et al., 2005; Pagell & Sheu, 2001; Leachman et al., 2005) use *cost for purchased materials as a share of the total manufacturing cost at a given point in time* as the measure of outsourcing. It is not evident from this kind of operationalization that a company has actually contracted out any manufacturing activities that formerly were done in house, which is the definition of outsourcing manufacturing used in the present study. Dabhilkar and Bengtsson (2008) used *change in cost for purchased materials as a share of the total manufacturing caused by an actual outsourcing initiative* as the measure.

The second type of wider approach study is survey research, which studies strategic sourcing (or a similar non-quantitative operationalization of outsourcing) in relation to other manufacturing practices. These studies can in turn be divided into three subsets (A-C):

A. The work of Narasimhan and Das (1999) focuses on different kinds of flexibility and contrasts the impact of strategic sourcing with the implementation of advanced manufacturing technology (AMT). This study shows that strategic sourcing can assist in the achievement of modification flexibility, which in turn can help influence manufacturing cost reduction. AMT helps in the achievement of volume flexibility.

B. The work of Narasimhan and Jayaram (1998) and the work of Waterson et al. (1999) both focus on manufacturing performance and contrast the effect of strategic sourcing/outsourcing with various other manufacturing practices. The former study showed that among the manufacturing practices only strategic sourcing has an impact on manufacturing goal achievement, while the latter showed that outsourcing has a much weaker impact than the other manufacturing practices.

C. The work of Narasimhan, Swink, and Kim (2005) and the work of Takeishi (2002) both focus on manufacturing capability progression and come to the same conclusion. Superior performance can only be obtained by those who have an internal as well as an external capability progression focus.

Notable in these studies in subsets A-C is that they do not use a quantitative measure of the degree of outsourcing manufacturing. In fact, it is not known if the companies under investigation in these studies have outsourced anything at all. These studies use multi-faceted constructs based on Likert-type scales. Common factors in strategic sourcing in these studies include: the extent of supplier assistance in product and process design, and in reducing new product introduction cycle time; supplier responsiveness to product modifications; delivery; and schedule volume changes. As discussed earlier, it is not evident from this kind of operationalization that a “strategic sourcer” has actually contracted out any manufacturing activities that formerly were done in house.

1.2 Previous studies with a narrow approach

The other strand of research takes a more narrow approach. Details of outsourcing are studied in isolation and consequently also separately from other manufacturing practices. Like the wide-focus studies, the results of the narrow studies show that there are no direct positive effects of outsourcing manufacturing on firm performance, yet there are circumstances that might moderate its impact on performance.

The narrow studies consist of two types: (a) pure modelling research and (b) surveys. While the modelling work of Anderson and Parker (2002) and Mieghem (1999) shows a negative impact, the studies by Plambeck and Taylor (2005), as well as Ülkü, Toktay, and Yücesan (2005), show a positive impact. Anderson and Parker argue that outsourcing decisions can create a path-dependent outsourcing trap in which a firm experiences higher long-run costs after an immediate cost benefit. Mieghem (1999) claims that a price-focused strategy for managing subcontractors can backfire, because a lower transfer price may decrease the manufacturer's profit. Plambeck and Taylor (2005) assert that the sale of production facilities to contract manufacturers (CMs) improves profitability for the industry as a whole if and only if Original Equipment Manufacturers (OEMs) are subsequently in a strong bargaining position vis-à-vis the CM. Ülkü et al. (2005) argue that outsourced manufacturing can be advantageous from a time-to-market perspective. OEMs can accelerate process adoption by risk sharing through joint investment. An efficient CM provides not only low costs but also rapid access to new process technologies, and therefore higher revenues.

The second type of narrow approach study is based on survey research. These studies agree that there are no direct effects of outsourcing manufacturing on firm performance (Gilley & Rasheed, 2000; Görg & Hanley, 2005; Leiblein, Reuer, & Dalsace, 2002; Mol, van Tulder, & Beijer, 2005). However, three of them show that there are circumstances that might moderate the impact of outsourcing manufacturing on firm performance. Gilley and Rasheed (2000) show that firm strategy and environmental dynamism moderate the relationship between outsourcing and performance. Görg and Hanley (2005) conclude that a positive impact of outsourcing manufacturing on firm performance only holds for plants with low export intensities. Leiblein et al. (2002) show that neither outsourcing nor internalization per se result in superior performance. Rather, a firm's technological performance is contingent upon the alignment between the firm's governance decisions and the degree of contractual risk.

Again, outsourcing is measured as *cost for purchased materials as a share of the total manufacturing cost at a given point in time* in these studies. Thus, whether or not the studied companies have engaged in any outsourcing activities is not known. It is not the level of purchase per se that is of interest. Rather, it is the change in purchase, given that a company actually has outsourced manufacturing activities.

1.3 Criteria for this research

Following this literature review a need for research that meets two different criteria was identified. First of all, more studies of companies that really have outsourced manufacturing operations are needed, ascertained by simply asking yes or no. Secondly,

more detailed outsourcing studies are needed that on the one hand study outsourcing in isolation, but concurrently involve several important factors, such as the motives for outsourcing, the characteristics of outsourced parts, supplier operating capabilities and supplier relationship strategies. As will be illustrated later in the “Conceptual research model and hypotheses” section, these factors play a central role in well-known conceptual make-or-buy frameworks; see, for example, the work of Cánez, Platts, & Probert (2000). However, these factors are lacking in previous empirical research on outsourcing practice and performance relationships. With this study, both these criteria are met.

2. Conceptual research model and hypotheses

Figure 1 depicts the conceptual research model. It is based on a review and synthesis of five well-known frameworks for the make-or-buy decision (Cánez et al., 2000; Holcomb & Hitt, 2007; McIvor, 2000; Venkatesan, 1992; Vining & Globerman, 1999). The theoretical underpinnings in all these frameworks can be traced back to both transaction cost economies (Williamson, 1975, 1985) and the resource-based view of the firm (Barney, 1991; Peteraf, 1993). The former specifies the economic conditions under which an organisation should manage an exchange internally within its boundaries, and the economic conditions suitable for managing an exchange externally, i.e., outsourcing. The latter views the firm as a bundle of resources that if employed in distinctive ways can create competitive advantage. Such distinctive resources are viewed as core business (Prahalad & Hamel, 1990) and should consequently be internalized while non-core business is outsourced.

Figure 1. Conceptual research model. (NPD = new product development; NPI = new product introduction.)

A reflection from reviewing these five make-or-buy frameworks is that although they are based on the same theoretical underpinnings, they differ considerably in content.

Therefore, in developing this conceptual research model common factors across these frameworks were sought as well as how they may complement each other. Four important factors emerged from this analysis: motives for outsourcing, characteristics of outsourced parts, supplier operating capabilities and supplier relationship strategies (see Table 1).

Table 1. Overview of the factors included in previous outsourcing frameworks

	Motives	Part characteristics	Supplier operating capabilities	Supplier relationship strategies
Venkatesan (1992)		X	X	
Vining & Globerman (1999)		X	X	
Cánez et al. (2000)	X		X	X
McIvor (2000)			X	X
Holcomb & Hitt (2007)		X	X	X

2.1 Motives

Motives are dealt with primarily in the work of Cánez et al. (2000). They argue that the external environment, on which the company has little or no influence, usually activates triggers that lead to motives for the make-or-buy analysis. For instance, increased price competition in the marketplace can be viewed as a trigger that usually forces companies to reduce costs (motive for outsourcing). Cánez et al. (2000) list a wide range of motives that can be grouped into five distinct subsets:

- Reduce costs
- Increase focus
- Increase quality
- Increase responsiveness
- Increase innovation capability.

This grouping is consistent with findings from several empirical studies across various geographical and industrial settings (Beaumont & Sohal, 2004; Dabhilkar & Bengtsson, 2008; Kakabadse & Kakabadse, 2002; Quélin & Duhamel, 2003).

A key point in Cárnez et al.'s (2000) framework is that there are interrelationships between different factors. One important such interrelationship is the link between motives and performance measures. The reason why performance measures are closely tied to motives is that they can provide some criteria to evaluate how well the targets suggested by the motives are achieved. This link has not been tested in previous empirical outsourcing practice-performance studies. The first hypothesis is formulated as follows:

Hypothesis 1: Motives for outsourcing have a direct performance impact. Performance improves in each area corresponding to a specific outsourcing motive.

2.2 Part characteristics

Three of the five reviewed frameworks deal in greater detail with part characteristics (Vining & Globerman, 1999; Holcomb & Hitt, 2007, Venkatesan, 1992). In particular, three types of part characteristics are pointed out as critical to consider in the make-or-buy analysis: volume/degree of standardization, complexity and importance.

- High-volume or standard parts can be linked to having low asset specificity (Vining & Globerman, 1999). These parts are a clear case for outsourcing. Outsourcing offers the potential for lower production costs for the product, as well as minimal bargaining and opportunism costs.

- Complexity in manufacturing and design is linked to technological uncertainty (Holcomb & Hitt, 2007). At increasingly higher levels of uncertainty, they argue that

greater information deficits emerge that reduce cost economies and increase the difficulty of interfirm collaboration.

- Parts having a high impact on what customers perceive as the most important product attributes should be classified as strategic (Venkatesan, 1992). This kind of sourcing is mostly linked to taking advantage of the suppliers' higher innovation capability and is often expressed as strategic sourcing (Venkatesan, 1992).

In summary, these frameworks suggest a direct impact of part characteristics on outsourcing performance. There is also strong support in previous empirical studies for assuming a direct impact, with the exception of Leiblein et al.'s (2002) work on asset specificity. As mentioned earlier in the literature review, they argue that standard performance models can improperly suggest a positive relationship between firms' outsourcing decisions and their technological performance. Their study indicates that neither outsourcing nor internalization per se result in superior performance, rather, a firm's technological performance is contingent upon the alignment between firms' governance decisions and the degree of contractual risk. However, as discussed in the literature review, the result of their study (and many others) is overshadowed by their approach to operationalizing outsourcing. Thus, there are still reasons for assuming asset specificity in terms of volume and degree of standardization directly influences outsourcing performance. Furthermore, there is clear support in the literature for assuming that complexity and importance also have a direct impact in the make-or-buy decision. With respect to complexity, Novak & Eppinger (2001), for example, show that

in-house production is more attractive when product complexity is high, as firms seek to capture the benefits of their investment in the skills needed to coordinate the development of complex designs. With respect to product importance and attributes, the work of Narasimhan & Das (1999) shows that strategic sourcing can assist in achieving modification flexibilities, which in turn are related to manufacturing cost reduction. Thus, the second hypothesis is formulated as follows:

Hypothesis 2: Part characteristics have a direct performance impact when outsourcing manufacturing.

2.3 Supplier operating capability

All five of the reviewed outsourcing frameworks indicate that the supplier's operating capabilities are an important factor to consider in the make-or-buy analysis, natural since the point in outsourcing is to find a partner that complements the capabilities of the focal company. More problematic is that most frameworks are rather vague in pinpointing what actually constitutes such capabilities and how these are related to improved performance. Admonitions such as "Outsource components where suppliers have a distinct comparative advantage – i.e., greater scale, fundamentally lower cost structure, or stronger performance incentives" are typical (Venkatesan, 1992, p. 98). Therefore, the work of Sturgeon (2002) is used here to try to narrow down what these capabilities actually might be and how they contribute to improved performance. Four such capabilities, or factors of performance improvements, are identified: volume, design for manufacturing, purchasing scale and low-wage operations.

- Higher volumes of outsourced parts at the supplier can lead to lower fixed costs. Having a common production platform that is used by several customers contributes to higher capacity utilization of plant space and machinery. This also implies that the supplier should be better able to cope with volume changes for individual customers since demand is aggregated for several customers. Higher volumes can also lead to lower variable costs for the supplier, who learns from the experience. Manufacturing the outsourced parts is often a core competence and prioritized activity at the supplier level. Therefore, the supplier should be able to provide lower costs, higher quality and shorter lead times, etc.

- Engineering/design capability for outsourced parts can lead to lower variable costs. By designing the same kind of parts for several customers, the supplier can alter product design to incorporate cheaper and better components. Standardizing manufacturing processes in turn leads to additional possibilities for continuous improvements.

- Purchasing capability for outsourced parts can lead to lower variable costs by using buying power to get pre-specified components for several customers at lower cost.

- Operations in low-wage countries can lead to lower variable costs. However, this requires labour-intensive manufacturing.

It is important to note that these capabilities also reflect a progression in supplier operating capabilities. By developing these capabilities contract manufacturers can move

up the value chain, thereby not being confined to pure manufacturing tasks, but including other value-adding activities such as design for manufacturability and purchasing. In conclusion, the third hypothesis is formulated as follows:

Hypothesis 3: Supplier operating capabilities have a direct performance impact when outsourcing manufacturing.

2.4 Supplier relationship strategy

Three of the reviewed frameworks acknowledge the importance of developing supplier relationship strategies when outsourcing manufacturing (Cáñez et al., 2000; McIvor, 2000; Holcomb & Hitt, 2007). Adapting buyer and supplier interaction improves the likelihood of leveraging the supplier's operating capabilities. McIvor (2000) asserts that the sourcing organisation will adopt an appropriate relationship strategy, which will be influenced primarily by the potential for opportunism in the relationship. Influences on opportunism may include issues such as part characteristics.

However, since the frameworks reviewed do not discuss exactly how these supplier relationship strategies can be operationalized, nor how they relate to different kinds of performance objectives, the work of Cousins (2005) is used here to complement the picture. Four relevant collaboration types emerge:

- (1) Sharing of production plans and systems
- (2) Adaptation of production processes
- (3) Common work for cost reduction

(4) Early supplier involvement in new product development (NPD).

Sharing of production plans and systems is related to having a cost focus and often described as operational collaboration. The use of this supplier relationship strategy reduces exposure to asset-specific investments but allows the firm to receive some benefits such as improved pricing and delivery performance through sharing operational schedules and linking forecasting systems (Cousins, 2005). In contrast, the other three collaboration types are related to having a more differentiated focus, such as trying to attain superior product functionality. These collaboration types, often described as strategic collaboration, are aimed at competitive advantage from the careful management of resources and capabilities to create distinct competence in the marketplace. In consequence, the fourth hypothesis is formulated as follows:

Hypothesis 4: Supplier relationship strategies have a direct positive effect when outsourcing manufacturing.

3. Methodology

3.1 Sample and data collection approach

A postal survey was distributed to a disproportionately stratified random sample of 563 manufacturing plants that are part of Swedish engineering industry companies (Table 2). This sampling technique is suggested when the population consists of subgroups with different numbers of plants (Forza, 2002). After two reminders, 267 of the targeted plants returned the instrument, yielding an overall response rate of 47%. However, the data analysis presented in this paper is only based on the 136 manufacturing plants that responded as having outsourced manufacturing operations during the previous three-year period. Therefore the actual response rate is 24%. Outsourcing manufacturing was defined as having an external supplier provide parts or “a family of parts” that formerly were manufactured internally (Cáñez et al., 2000).

Table 2. Sample characteristics and response rate

	Stratum (number of employees)					
	50-99	100-199	200-499	500-999	1000+	Σ
Population (ISIC 28-35)	466	241	155	48	28	938
Target sample	188	144	155	48	28	563
Answered the survey	80	77	69	24	17	267
Response rate	43%	53%	45%	50%	61%	47%
<i>Focus in this study:</i> Has outsourced manufacturing operations during the last 3 years (No = 0 / Yes = 1)	34	44	33	15	10	136

Note: Key to ISIC codes: 28 = Fabricated metal products; 29 = Machinery and equipment; 30 = Office machinery and computers; 31 = Electrical machinery and apparatus not elsewhere classified; 32 = Radio, television and communication equipment and apparatus; 33 = Medical, precision and optical instruments, watches and clocks; 34 = Manufacture of motor vehicles, trailers and semi-trailers; 35 = Other transport equipment.

Statistics Sweden's Business Register 2003 of manufacturing plants with more than 50 employees within ISIC codes 28–35 was used as the sample frame. Data were collected during early spring 2004; whenever the phrase *the studied three-year period* is used in the article the calendar years 2001, 2002 and 2003 are meant. The unit of analysis was manufacturing plants of engineering industry companies.

In order to detect response bias, a random sample of 98 plants that had declined to fill in the form and return it after two reminders was contacted by telephone. Thirty-four plants agreed to answer five key questions from the original instrument in the following three topic areas: the strategic role of the manufacturing function, the degree of outsourcing manufacturing and plant performance. This enabled a comparison between those that participated in the survey and those that did not. No significant response bias was detected. Those that declined to participate in the telephone interview as well gave the following reasons for not participating in the study: Three units were not proper manufacturing plants and 23 plants were not interested due to lack of time. At the remaining 38 plants it was not possible to contact the production manager during the time of this study. More details on data collection and sample can be found in Dabhilkar (2006).

3.2 Variables

Table 3 briefly presents the variables and scales that were used. In the following sections (3.2.1-3.2.3) all variables are described in greater detail.

Table 3. Description of variables and scales

Variable	Scale
<i>Control variables</i>	
Plant size (5 size strata → 4 dummy variables)	Dummy coding
Industry type (8 ISIC strata → 7 dummy variables)	Dummy coding
Rate of new product introduction (1 item)	7-point ordinal scale
Outsourcing intensity (1 item)	Percentage
<i>Independent variables</i>	
Motives (5 items)	5-point Likert scales
Part characteristics (4 items)	5-point semantic differential scales
Supplier operating capabilities (4 items)	5-point semantic differential scales
Supplier relationship strategies (4 items)	5-point Likert scales
<i>Dependent variables</i>	
Outsourcing performance effect (6 items)	7-point Likert scales

3.2.1 Control variables

The influence from four contextual variables was controlled for, namely: Plant size, Industry type, Rate of new product introduction and Outsourcing intensity.

Plant size

Plant size was measured according to the stratification of the sample (see Table 2), using dummy variables following the example in Field (2005, p. 208). Dummy coding is a way of representing groups of observations using only zeros and ones. To do this, several variables had to be created, one fewer than the number of groups that was recoded. In this case, the sample was stratified into five size groups, hence four dummy variables were created.

Industry type

For Industry type, dummy variables were used as well. In this case, the sample was stratified into eight industry types (see Table 2), so seven dummy variables were created.

Rate of new product introduction

Rate of new product introduction was measured according to the answers to the survey item “For how long do you on average manufacture your products before they are replaced by newer variants? 1 = < 6 months, 2 = 6-12 months, 3 = 1 year, 4 = 2 years, 5 = 3-4 years, 6 = 5-8 years, 7 = > 8 years”.

Outsourcing intensity

Outsourcing intensity was measured according to the *change in degree of cost for purchased materials as a share of the total manufacturing cost for the main product line* during the studied three-year period.

3.2.2 Independent variables

Four sets of independent variables were used, representing the different factors depicted in the conceptual research model.

Motives

Motives for outsourcing were measured according to the construct “How important were the following motives for outsourcing manufacturing during the last three years?”

- Reduce cost for outsourced component(s)
- Improve company focus
- Increase product quality
- Increase responsiveness to variability in demand
- Take advantage of supplier’s greater innovation capability”.

Each motive was measured on a five-point Likert scale where 1 = No importance, 5 = Determining factor.

Part characteristics

Part characteristics were evaluated according to the answers to the following four items “How would you characterize your outsourcing of manufacturing operations during the last three years?”

- Unique parts/low volumes ↔ Standard parts/high volumes
- Parts easy to manufacture ↔ Parts complex to manufacture
- Parts easy to design ↔ Parts complex to design
- Parts of little importance to end product or customer value ↔ Parts of critical importance to end product or customer value”.

A five-point semantic differential scale was used for each item.

Supplier operating capabilities

Supplier operating capabilities were measured according to answers to the construct “How would you characterize your outsourcing of manufacturing operations during the last three years?

- Supplier has marginally or equally high volumes of outsourced parts ↔ Supplier has far higher volumes of outsourced parts
- Design responsibility not outsourced ↔ Design responsibility outsourced as well
- Purchase responsibility for in-house components not outsourced ↔ Purchase responsibility for in-house components outsourced as well
- Supplier situated in country with equal wage level ↔ Supplier situated in low-wage country”.

A five-point semantic differential scale was used for each item.

Supplier relationship strategies

Finally, Supplier relationship strategies were measured according to answers to the construct: “Rate the following statements regarding the collaboration with your most important suppliers:

- Access is given to production plans and systems.
- Active cooperation takes place in order to adapt production processes to the needs of both companies.
- We undertake common work for cost reduction.
- Our most important suppliers participate early in the development of new products”.

Each statement was measured on a five-point Likert scale where 1 = Not at all, 5 = To a very high extent.

3.2.3 Dependent variables

Outsourcing performance was measured according to the construct “What was the effect of your outsourcing initiative on the following performance measures?

- Cost for outsourced component(s)
- Efficiency in remaining operations
- Lead time from order to delivery for end product
- Quality
- Responsiveness to variability in demand
- New functionality in outsourced component”.

A seven-point Likert scale was used for each item where -3 = Much worse, 0 = No effect, 3 = Much better.

4. Results

The hypotheses were tested using multiple regression analysis. Table 4 provides descriptive statistics and intercorrelations for all included dependent and independent variables in the analyses. Multicollinearity was controlled for by checking VIF-values greater than 10, tolerance statistics below 0.2 and correlations greater than 0.80, in line with Hair, Anderson, Tatham, and Black (1998) and Field (2005). The analysis clearly showed no evidence of multicollinearity. Outliers (standardized residuals >1.96) and influential observations (Mahalanobis distances >50) were also searched for and

subsequently removed when found, which is the main reason why N varies across the regression models.

4.1 Testing Hypotheses 1-4

Results of the multiple regression analyses are shown in Table 5. Support for H1 is found. Outsourcing motives have a direct performance impact. Performance is shown to improve in each area that corresponds to the specific outsourcing motives. A deeper level analysis also shows, however, that outsourcing motives do not explain all the variation in the dependent variables. This has two main implications. Firstly, not all intentions were realized. Secondly, there are other significant factors of performance improvements when outsourcing manufacturing, for example part characteristics and supplier operating capabilities.

Support for H2 is found. Part characteristics have a direct performance impact when outsourcing manufacturing. The variable High volume/standard parts positively affects plant efficiency and product functionality. High complexity in manufacturing has a negative impact on product cost, delivery lead time and product quality. Although complexity in design does not seem to have a direct effect on any of the performance measures, it is correlated to other independent variables such as Complexity in manufacturing and the supplier operating capability variable Engineering/design of outsourced parts. The part's importance to the perception of the end-product has a positive impact on plant efficiency.

Table 4. Descriptive statistics and intercorrelations (table continues overleaf)

		Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11
1	Product cost	4.90	1.46	1.00										
2	Plant efficiency	4.79	0.95	0.09	1.00									
3	Delivery lead time	3.99	1.12	0.03	0.17	1.00								
4	Product quality	4.07	1.07	0.27**	0.09	0.25**	1.00							
5	Volume flexibility	4.95	1.02	0.05	0.10	0.18*	-0.07	1.00						
6	Product innovation	4.05	0.70	0.08	0.26**	0.13	0.31**	-0.10	1.00					
7	Reduce costs for outsourced component	3.63	1.49	0.54**	-0.02	-0.05	0.05	-0.16	-0.01	1.00				
8	Improve company focus	2.75	1.45	0.13	0.24**	0.13	0.04	0.01	0.06	0.21*	1.00			
9	Increase product quality	1.90	1.22	0.00	0.14	0.04	0.49**	-0.11	0.32**	0.07	0.28**	1.00		
10	Increase responsiveness to variability in demand	3.16	1.44	0.08	0.10	0.03	-0.07	0.54**	-0.02	0.02	0.22**	-0.03	1.00	
11	Take advantage of suppliers' innovation capability	1.88	1.10	0.02	0.12	0.05	0.23**	-0.09	0.40**	0.13	0.32**	0.61**	0.07	1.00
12	High volume / Standard parts	3.25	1.32	0.07	0.12	-0.03	0.16	0.02	0.10	0.04	-0.01	0.15	0.02	-0.01
13	Complexity in manufacturing	2.65	1.16	-0.23**	-0.02	-0.17*	-0.24**	-0.02	-0.05	-0.12	-0.05	-0.05	0.05	0.09
14	Complexity in design	2.86	1.08	-0.13	-0.07	-0.15	-0.12	-0.03	0.02	-0.17	-0.02	-0.04	-0.01	0.03
15	Importance to perception of end-product	2.70	1.22	-0.11	0.08	-0.12	-0.11	-0.03	0.10	-0.11	-0.07	0.08	-0.15	0.17
16	Higher volumes of outsourced parts	2.87	1.46	0.11	0.19*	-0.03	0.22*	-0.05	0.26**	0.25**	0.03	0.29**	0.08	0.09
17	Engineering / Design of outsourced parts	1.67	1.22	0.06	0.09	0.01	0.15	-0.16	0.29**	-0.05	-0.01	0.18*	-0.04	0.17
18	Purchasing materials for outsourced parts	2.55	1.63	-0.06	0.13	0.10	0.06	-0.09	0.18*	0.04	0.15	0.05	-0.07	0.08
19	Operations in low-wage countries	2.67	1.64	0.42**	-0.15	-0.16	0.02	-0.14	-0.09	0.52**	-0.06	-0.02	-0.06	-0.06
20	Sharing of production plans and systems	3.19	1.13	0.08	0.04	0.10	0.00	-0.06	0.06	0.26**	0.25**	0.07	0.09	0.27**
21	Adaptation of production processes	2.73	0.96	-0.02	0.13	0.10	0.02	-0.08	0.18*	0.12	0.11	0.21*	-0.03	0.24**
22	Common work for cost reduction	3.21	0.97	-0.09	0.04	0.16	0.02	-0.06	0.16	0.11	0.12	0.23**	-0.06	0.21*
23	Early supplier involvement in NPD	3.29	1.15	0.04	0.06	0.14	0.06	-0.05	0.18*	0.10	0.25**	0.21*	-0.09	0.23**

		12	13	14	15	16	17	18	19	20	21	22
12	High volume / Standard parts	1.00										
13	Complexity in manufacturing	-0.46**	1.00									
14	Complexity in design	-0.22*	0.58**	1.00								
15	Importance to perception of end-product	-0.17	0.35**	0.18*	1.00							
16	Higher volumes of outsourced parts	0.13	0.12	-0.06	-0.05	1.00						
17	Engineering / Design of outsourced parts	0.08	0.17	0.21*	0.02	0.14	1.00					
18	Purchasing materials for outsourced parts	0.10	-0.06	0.00	-0.15	0.03	0.37**	1.00				
19	Operations in low-wage countries	0.19*	-0.12	-0.13	-0.01	0.20*	0.04	-0.04	1.00			
20	Sharing of production plans and systems	-0.08	0.06	-0.08	-0.01	0.05	0.12	0.19*	0.10	1.00		
21	Adaptation of production processes	-0.03	-0.03	-0.12	-0.06	0.08	0.22*	0.11	0.03	0.51**	1.00	
22	Common work for cost reduction	0.02	-0.09	-0.08	0.02	0.06	0.05	0.12	0.11	0.44**	0.49**	1.00
23	Early supplier involvement in NPD	-0.13	0.00	-0.04	-0.03	0.10	0.09	0.10	-0.07	0.36**	0.45**	0.55**

Notes: * = $p < 0.05$, ** = $p < 0.01$.

Table 5. Results of regression analyses – standard coefficients beta

	Product cost	Plant efficiency	Delivery lead time	Product quality	Volume flexibility	Product innovation
Control variables						
<i>Size</i>						
50-99 vs. 100-199 dummy	0.01	0.30*	-0.03	-0.06	0.19	0.23*
50-99 vs. 200-499 dummy	-0.06	0.18	-0.08	-0.09	0.04	0.30**
50-99 vs. 500-999 dummy	0.00	0.24*	0.06	-0.03	0.05	0.14
50-99 vs. 1000+ dummy	-0.08	-0.04	-0.18	-0.23**	0.00	0.04
<i>Industry type</i>						
ISIC 28 vs. 29 dummy	-0.07	-0.24	0.13	0.09	-0.09	-0.01
28 vs. 30 dummy	0.03	-0.08	-0.02	0.12	0.04	-0.01
28 vs. 31 dummy	0.00	-0.19	0.05	0.00	-0.01	0.03
28 vs. 32 dummy	0.06	-0.22*	0.06	-0.01	-0.02	-0.17
28 vs. 33 dummy	0.03	-0.24*	-0.15	-0.11	-0.04	-0.05
28 vs. 34 dummy	-0.06	-0.16	0.02	0.00	-0.06	0.01
28 vs. 35 dummy	0.03	-0.10	0.00	0.01	0.12	-0.06
Rate of new product introduction	0.01	0.00	0.00	-0.10	-0.04	0.04
Outsourcing intensity	-0.09	-0.05	0.23**	0.04	0.15**	0.18*
Independent variables						
<i>Motives</i>						
Cost	0.42**	0.02	-0.03	-0.18	-0.09	0.05
Focus	0.03	0.20*	0.03	-0.05	-0.11	-0.12
Quality	-0.05	0.00	0.03	0.48**	0.08	0.06
Responsiveness	0.09	0.05	-0.04	-0.11	0.67**	-0.14
Innovation	0.04	-0.04	0.02	0.01	-0.18	0.25*
<i>Part characteristics</i>						
High volume/Standard parts	-0.08	0.20*	-0.18	-0.06	0.08	0.25*
Complexity in manufacturing	-0.24*	0.10	-0.26*	-0.34**	0.04	-0.02
Complexity in design	0.04	-0.12	-0.11	0.06	-0.08	-0.12
Importance to perception of end-product	-0.01	0.20*	-0.07	-0.08	0.06	0.04
<i>Supplier operating capability</i>						
Higher volumes of outsourced parts	-0.01	0.22*	0.07	0.22**	-0.20**	0.18*
Engineering/Design of outsourced parts	0.18*	0.02	0.08	0.07	-0.11	0.21*
Purchasing materials for outsourced parts	-0.15	0.13	0.08	0.06	0.06	-0.01
Operations in low-wage countries	0.19*	-0.27**	-0.24*	0.01	-0.05	-0.31**
<i>Supplier relationship strategy</i>						
Sharing of production plans and systems	0.03	-0.02	0.11	0.06	0.02	-0.02
Adaptation of production processes	-0.11	0.15	-0.14	-0.09	-0.09	0.14
Common work for cost reduction	-0.21*	-0.03	0.11	-0.13	-0.14	-0.12

Early supplier involvement in NPD	0.19	-0.06	0.04	0.10	0.14	0.05
<i>Adj R²</i>	0.30	0.11	0.14	0.38	0.46	0.24
<i>F (full model)</i>	2.90**	1.56*	1.68*	3.6**	4.62**	2.30**
<i>N</i>	136	136	131	130	128	128

Notes: * = $p < 0.05$, ** = $p < 0.01$.

Support for H3 is found. Supplier operating capabilities have a direct performance impact when outsourcing manufacturing. Higher volumes of outsourced parts lead to improved plant efficiency, product quality and product functionality, but deteriorated volume flexibility. An engineering/design capability has a positive impact on product cost and product functionality. A purchasing capability, however, does not have an impact on any of the performance measures. It is important to note that purchasing is *correlated* to both improved product functionality and the supplier's engineering/design capability. However, when the effect of all other variables in the analyses is accounted for, purchasing capability does not have a direct impact on the dependent variables in the analysis. Operations in low-cost countries has a positive impact on product cost but negative impact on plant efficiency, delivery lead time and product functionality.

Surprisingly, no support for H4 was found. Supplier relationship strategies have no direct positive effects when outsourcing manufacturing. On the contrary, common work for cost reduction has a negative impact on product cost. An interesting additional detail comes from studying the correlation matrix in Table 4. There are some basic correlations between variable 6 and variables 21 and 23. The dependent variable Product functionality seems to be related to the supplier relationship strategies. This is also validated by

checking the correlations between motives and the supplier relationship strategy variables. Thus, supplier relationship strategies have some kind of impact. In any case, when the effects from all the other variables are accounted for in the regression analysis, part characteristics and supplier operating capabilities have a greater performance impact on product functionality than the supplier relationship strategies.

4.2 Control variables

The overall conclusion from studying the effects of the control variables is that the regression models are robust. The main test results hold regardless of plant size, industry type, rate of new product introduction or outsourcing intensity. A closer look at Table 5 reveals some interesting details.

Controlling for plant size shows that smaller plants improve internal operations efficiency to a greater extent than the largest group (1000+ employees). A possible explanation is that the degree of outsourcing for large plants is too little to have a significant impact on overall efficiency. However, this plant size experiences the most problems with quality. Furthermore, smaller plants seem to achieve greater improvements in product functionality. Further research must clarify why this is the case. Possibly, smaller plants have greater resource constraints and therefore are more dependent on their supplier's innovation capabilities.

Controlling for industry type shows that plant efficiency deteriorated significantly for ISIC codes 32 and 33 (Telecom, Electronics and Medical Technology, etc). Exactly why this is the case is not known. Further research must clarify this.

Surprisingly, rate of new product introduction has no direct effect on outsourcing performance. However, ancillary analysis of the correlation matrix shows that a high rate of NPI is related to suppliers having higher volumes and design/engineering capabilities. Thus, NPI is more directly related to the kind of suppliers selected rather than the performance improvements achieved.

Controlling for outsourcing intensity shows that improvements in delivery lead time, volume flexibility and product functionality are related to higher changes in purchased goods and services as a share of total manufacturing cost. Thus, plants have to make rather drastic changes in order to improve these performance areas.

5. Discussion

5.1 Findings

There are two major findings of the study. Firstly, most companies achieve their objectives in outsourcing. Performance is shown to improve corresponding to specific outsourcing motives. On the one hand, this is good news for the purchasing manager, who can improve performance in a wide spectrum of areas by outsourcing manufacturing. Yet, as discussed in the Results section, not all variation in the dependent variables is explained by motives, meaning that some outsourcing initiatives have failed and that

factors such as part characteristics and supplier operating capabilities must be considered in the make-or-buy decision process.

Bringing motives into the analysis also has important implications in relation to the previous outsourcing practice and performance literature. There are at least two related circumstances that may explain why previous studies found negative effects or no effects at all: (1) performance is shown to improve in relation to specific outsourcing motives and (2) the motives for manufacturers to outsource manufacturing vary greatly (Dabhilkar & Bengtsson, 2008). To conclude, it is not remarkable that some studies show negative or no effects. Assessed performance measures in these previous studies likely did not correspond well with outsourcing motives. Thus, future research should include motives in the analysis.

The second major finding concerns the specific factors of performance improvements when outsourcing manufacturing. The conceptual model reflected four sets of factors: motives, part characteristics, supplier operating capabilities and supplier relationship strategies. Of the latter three, supplier relationship strategies surprisingly did not have a significant positive direct impact on any of the studied performance areas. As shown in the summary in Table 6, only part characteristics and supplier operating capabilities proved to be important.

Table 6. Summary of findings

Outsourcing decision factor	Positive performance impact	Negative performance impact
<i>Part characteristics</i>		
High volume/standard parts	<ul style="list-style-type: none"> • Plant efficiency • Product functionality 	
Manufacturing complexity		<ul style="list-style-type: none"> • Cost • Delivery lead times • Product quality
Importance of the part to the perception of the end-product	<ul style="list-style-type: none"> • Plant efficiency 	
<i>Supplier operating capabilities</i>		
Higher volumes of outsourced parts	<ul style="list-style-type: none"> • Plant efficiency • Product quality • Product functionality 	<ul style="list-style-type: none"> • Volume flexibility
Engineering/design of outsourced parts	<ul style="list-style-type: none"> • Product cost • Product functionality 	
Operations in low-wage countries	<ul style="list-style-type: none"> • Product cost 	<ul style="list-style-type: none"> • Plant efficiency • Delivery lead time • Product functionality

There are at least two important implications of this summary. The first is that not all factors in the conceptual model have a direct performance impact. Neither complexity in design nor purchasing as a supplier operating capability predicts performance as well as supplier relationship strategies do. Why? The second implication is the significant trade-offs that follow an outsourcing decision. Both these implications are discussed below in greater detail.

5.2 Varying degree of predictive power for some factors

Addressing the issue of supplier relationship strategies first, there are at least two possible explanations. The first one is based on the assumption that many high-involvement

relationships are of a long-term nature (Gadde & Mattsson, 1987; Håkansson & Snehota, 1995). Maybe structural factors such as economies of scale or lower wages have a stronger performance impact than relationship strategies in the short run. It is important to remember that the present study has only a three-year perspective. Most probably, the longer time needed to develop relationship strategies means performance impacts take time as well.

The second related explanation has been expressed by Gadde and Snehota (2000), who argue that high-involvement relationships demand resources and must be restricted to a handful of suppliers. To the claim that integration is the superior solution in making the most of supplier relationships, they counter that this is an oversimplification that, if followed blindly, may be bad in practice. Developing partnerships with suppliers can be justified only when relationship benefits exceed the costs. Applying this to the findings of this study, it seems possible that companies choose to take advantage of the supplier's operating capabilities rather than investing in closer collaboration.

Since there are plenty of studies showing the benefits of differentiated supplier relationship strategies (Cousins, 2002; Cousins, 2005; Cousins, Lamming, Lawson, & Squire, 2008) it is important to be careful in interpreting results and drawing conclusions. A deeper look, however, reveals that although these studies focus on relationship strategies, few of them study them in relation to outsourced manufacturing. The handful of studies that do so (for example Marshall, McIvor, & Lamming, 2007) are based on case studies only. With this in mind it is concluded that high-involvement supplier

relationships are not a source of performance improvement when outsourcing manufacturing. Engaging in high-involvement relationships is probably too time-consuming and resource-demanding. Rather than investing time and effort in such relations, companies seem to be better off emphasising the benefits inherent in part characteristics and supplier operating capabilities.

Why doesn't complexity in design influence outsourcing performance whereas complexity in manufacturing does? A closer look into the correlation matrix reveals several relationships to other independent variables in the analysis, including the other part characteristics and the supplier operating capability of engineering/design. This suggests that complexity in design cannot be neglected. There may be interaction effects in this respect, which are unfortunately outside the scope of this paper, but could be interesting for further research.

Why doesn't purchasing as a supplier operating capability influence outsourcing performance? Again, the correlation matrix is a useful starting point. There is a correlation between purchasing capability and product functionality. However, when the effect of the other variables in the analysis is accounted for, the direct impact of purchasing drops off. Moreover, there are correlations to other independent variables such as engineering/design capability of outsourced parts and the relationship strategy of sharing production plans and systems with the supplier. The correlation to engineering/design capability fits well with the conceptual discussion of contract manufacturers moving up the value chain by integrating such functions. The correlation

to the supplier relationship strategy prompts the future study of possible interaction effects.

5.3 Outsourcing manufacturing and performance trade-offs

The second of the implications raised earlier is that specific factors that have a positive impact only affect certain performance measures, not all, so the make-or-buy decision is actually very complicated. Decision-makers must know exactly which performance measures they want to improve.

Even more importantly, there are significant trade-offs. Factors that improve one performance dimension can negatively impact another, yet another reason for making the outsourcing decision carefully. Two different supplier operating capabilities may cause a trade-off situation. For example, when the supplier has higher volumes of outsourced parts, internal efficiency, quality and functionality are improved while volume flexibility is lost. This is actually very strange and reveals a mismatch between theory and practice. Even though the point in turning to a supplier with higher volumes of outsourced parts is their (theoretical) capability to aggregate demand from several customers and thereby better manage peaks in demand for individual customers, in real life higher volumes entail lost volume flexibility. A second trade-off situation identified by the present study is the supplier with operations in low-wage countries, since improved product cost is gained at the expense of lost speed and product functionality.

Trade-offs in operations strategy are a subject for debate (Boyer & Lewis, 2002). One view, the trade-off model, was developed in the seminal work of Skinner (1969). This model proposes that companies must choose which competitive priorities should receive the greatest investment of time and resources. “Competitive priorities denote a strategic emphasis on developing certain manufacturing capabilities that may enhance a plant’s position in the marketplace” (Boyer & Lewis, p. 9). The effectiveness of an operations strategy is therefore determined by the degree of consistency between competitive priorities and corresponding decisions regarding operational structure and infrastructure. In contrast, advocates of the cumulative sand cone model (Ferdows & De Meyer, 1990) claim that trade-offs are irrelevant, since modern practices such as world-class manufacturing enable concurrent improvements in quality, cost, flexibility and delivery.

In relation to this debate the present study shows that outsourcing differs from other manufacturing practices in that it causes trade-off situations. Other practices, such as Advanced Manufacturing Technology, World-Class Manufacturing and modularization, enable concurrent improvements in several performance areas.

5.4 Limitations

The data were collected in 2004 and cover the years 2001-2003. Since outsourcing is context-dependent, outsourcing motives and strategies are likely to have changed over the years. The study was conducted during a period in time when outsourcing and/or offshoring of manufacturing was a popular strategy. Today, the competitive environment may be different, implying that when comparing these results with more recent work, contextual variables must be taken into consideration.

In addition, the sample only included manufacturing plants from a narrow sector (ISIC codes 28–35), which is important to acknowledge when comparing results with other studies. This means for instance that the process industry has been omitted. However, the usage of ISIC codes 28-35 is used in research on manufacturing strategy; compare for instance IMSS (International Manufacturing Strategy Survey), see for instance Frohlich & Westbrook, 2001. Moreover, the geographical location of Sweden makes it difficult to generalize findings regarding low wages countries. For example, plants in countries with shorter geographical distance to low cost regions may not experience the negative impact on delivery lead times as shown in this study.

Finally, the used term “large plants” must be qualified. In this paper it refers to plants in the sample with more than 1000 employees, while sometimes large refers to plants with more than 5000 employees. The reason for the different stratification and use of the term here is a consequence of studying the manufacturing sector in Sweden. There are only two plants in the whole population frame that have more than 5000 employees. The stratum would have become too small comprising only two observations. This is why plant size greater than 1000 employees is considered as large in this paper. The implication of this is that it may be difficult to generalize the findings to all large plants.

6. Conclusions

This research meets a need for more comprehensive empirical studies on outsourcing manufacturing. By considering several factors the present study clarifies their relative

importance as well as their performance impacts. The first main conclusion that follows from this study is that factors related to supplier selection have a stronger outsourcing performance impact than those related to supplier collaboration. Part characteristics and supplier operating capabilities are in particular shown to predict outsourcing performance, while supplier relationship strategies do not.

From a theoretical point of view, this has important implications for future outsourcing research. Since rather few of the measured factors are able to predict outsourcing performance and since they also explain a relatively low share of the variation in some of the dependent variables, there is ample opportunity for theory development in this respect. Links between factors in current frameworks must be clarified, but more importantly other kinds of factors that better explain outsourcing performance must be added. While the current outsourcing frameworks that underlie the present study have a focus on content-related factors (why outsource? what? and to whom?), it might be necessary to add factors concerned with the process of outsourcing, to study the make-or-buy decision in organisational context (Moses and Åhlström, 2007). Examples are the role and involvement of the purchasing department within the buying organisation, the skills of buyers and managers, the proficiency and formalization of the make-or-buy decision process, as well as the usage of techniques such as total cost of ownership. Current make-or-buy frameworks are lacking in these factors, while current research into the future role of purchasing and supply management clearly has envisaged a need for them (Cousins and Spekman, 2003).

The second and last main conclusion is that outsourcing entails competitive advantages but also significant disadvantages that must not be neglected. Therefore the purchasing manager facing a make-or-buy decision also has to consider which performance objectives (s)he is willing to sacrifice in order to achieve excellence in another. The present study shows that unlike many other modern management practices, such as mass customization, outsourcing leads to trade-off situations. The study is unique in its ability to pinpoint the specific make-or-buy factors that create trade-offs between different performance dimensions. Previous studies argue that trade-offs when outsourcing manufacturing concern trading one make-or-buy decision factor for another, such as part characteristics versus supplier operating capabilities, see for example the work of Cánez et al. (2000). The present study validates this, but also reveals that when outsourcing manufacturing there are trade-offs between different performance dimensions, such as cost versus innovation. Hence, further theory development on trade-offs when outsourcing manufacturing is needed and furthermore must build on both of these contrasting perspectives.

References

- Anderson, E. G., & Parker, G. G. (2002). The effect of learning on the make/buy decision. *Production and Operations Management*, 11(3), 313-339.
- Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, 17(1), 99-120.
- Beaumont, N., & Sohal, A. (2004). Outsourcing in Australia. *International Journal of Operations & Production Management*, 24(7), 688-700.

- Boyer, K. K., & Lewis, M. W. (2002). Competitive priorities: Investigating the need for trade-offs in operations strategy. *Production and Operations Management*, 11(1), 9-20.
- Cáñez, L. E., Platts, K. W., & Probert, D. R. (2000). Developing a framework for make-or-buy decisions. *International Journal of Operations & Production Management*, 20(11), 1313-1330.
- Cousins, P. D. (2002). A conceptual model for managing long-term inter-organisational relationships. *European Journal of Purchasing & Supply Management*, 8(2), 71-82.
- Cousins, P. D. (2005). The alignment of appropriate firm and supply strategies for competitive advantage. *International Journal of Operations & Production Management*, 25(5-6), 403-428.
- Cousins, P. D., Lamming, R., Lawson, B., & Squire, B. (2008). *Strategic supply management: Principles, theories and practice*. Harlow, England: Pearson Education.
- Cousins, P. D., & Spekman, R. (2003). Strategic supply and the management of inter- and intra-organisational relationships. *Journal of Purchasing and Supply Management*, 9(1), 19-29.
- Dabhilkar, M. (2006). *Acting creatively for enhanced performance: Challenges for Swedish manufacturers in an age of outsourcing*. Doctoral dissertation, Royal Institute of Technology, Stockholm.

- Dabhilkar, M., & Bengtsson, L. (2008). Invest or divest? On the relative improvement potential in outsourcing manufacturing. *Production Planning & Control*, 19(3), 212-228.
- Ferdows, K., & De Meyer, A. (1990). Lasting improvements in manufacturing performance: In search of a new theory. *Journal of Operations Management*, 9(2), 168-184.
- Field, A. (2005). *Discovering statistics using SPSS*. London: SAGE.
- Forza, C. (2002). Survey research in operations management: A process based perspective. *International Journal of Operations & Production Management*, 22(2), 152-194.
- Frohlich, M.T. & Westbrook, R. (2001). Arcs of integration: an international study of supply chain strategies. *Journal of Operations Management*, Volume 19, Issue 2, February 2001, Pages 185-200.
- Gadde, L.-E., & Mattsson, L.-G. (1987). Stability and change in network relationships. *International Journal of Research in Marketing*, 4(1), 29-41.
- Gadde, L.-E., & Snehota, I. (2000). Making the most of supplier relationships. *Industrial Marketing Management*, 29(4), 305-316.
- Gilley, K., & Rasheed, A. (2000). Making more by doing less: An analysis of outsourcing and its effects on firm performance. *Journal of Management*, 26(4), 763-790.
- Görg, H., & Hanley, A. (2005). International outsourcing and productivity: Evidence from the Irish electronics industry. *North American Journal of Economics and Finance*, 16(2), 255-269.

- Hair, J. P., Anderson, R. E., Tatham, R. L., & Black, W. C. (1998). *Multivariate data analysis*. Upper Saddle River, New Jersey: Prentice Hall.
- Holcomb, T. R., & Hitt, M. A. (2007). Toward a model of strategic outsourcing. *Journal of Operations Management*, 25(2), 464-481.
- Håkansson, H., & Snehota, I. (Eds.). (1995). *Developing relationships in business networks*. London: Routledge.
- Kakabadse, A., & Kakabadse, N. (2002). Trends in outsourcing: Contrasting USA and Europe. *European Management Journal*, 20(2), 189-198.
- Laugen, B., Acur, N., Boer, H., & Frick, J. (2005). Best manufacturing practices: What do the best performing companies do? *International Journal of Operations & Production Management*, 25(2), 131-150.
- Leachman, C., Pegels, C. C., & Shin, S. K. (2005). Manufacturing performance: Evaluation and determinants. *International Journal of Operations & Production Management*, 25(9), 851-874.
- Leiblein, M. J., Reuer, J. J., & Dalsace, F. (2002). Do make or buy decisions matter? The influence of organizational governance on technological performance. *Strategic Management Journal*, 23, 817-833.
- Marshall, D., McIvor, R., & Lamming, R. (2007). Influences and outcomes of outsourcing: Insights from the telecommunications industry. *Journal of Purchasing and Supply Management*, 13(4), 245-260.
- McIvor, R. (2000). A practical framework for understanding the outsourcing process. *Supply Chain Management: An International Journal*, 5(1), 22-36.

- Mieghem, J. A. (1999). Coordinating investment, production, and subcontracting. *Management Science*, 45(7), 954-971.
- Mol, M., van Tulder, R., & Beije, P. (2005). Antecedents and performance consequences of international outsourcing. *International Business Review*, 14(5), 599-617.
- Moses, A., & Åhlström, P. (2008). Problems in cross-functional sourcing decision processes. *Journal of Purchasing and Supply Management*, 14(2), 87-99.
- Narasimhan, R., & Das, A. (1999). An empirical investigation of the contribution of strategic sourcing to manufacturing flexibilities and performance. *Decision Sciences*, 30(3), 683-718.
- Narasimhan, R., & Jayaram, J. (1998). An empirical investigation of the antecedents and consequences of manufacturing goal achievement in North American, European, and Pan Pacific firms. *Journal of Management*, 16, 159-176.
- Narasimhan, R., Swink, M., & Kim, S. W. (2005). An exploratory study of manufacturing practice and performance interrelationships. *International Journal of Operations & Production Management*, 25(10), 1013-1033.
- Novak, S., & Eppinger, S. D. (2001). Sourcing by design: Product complexity and the supply chain. *Management Science*, 47(1), 189-204.
- Pagell, M., & Sheu, C. (2001). Buyer behaviours and the performance of the supply chain: An international exploration. *International Journal of Production Research*, 39(13), 2783-2801.
- Peteraf, M. A. (1993). The cornerstones of competitive advantage: A resource-based view. *Strategic Management Journal*, 14(3), 179-191.

- Plambeck, E. L., & Taylor, T. A. (2005). Sell the plant? The impact of contract manufacturing on innovation, capacity, and profitability. *Management Science*, 51(1), 133-150.
- Prahalad, C. K., & Hamel, G. (1990). The core competence of the corporation. *Harvard Business Review*, 68(3), 79-91.
- Quélin, B., & Duhamel, F. (2003). Bringing together strategic outsourcing and corporate strategy: Outsourcing motives and risks. *European Management Journal*, 21(5), 647-661.
- Sherefkin, R., & Barkholz, D. (2008). Chrysler sues consultant over sourcing [Electronic version]. *Automotive News*. Retrieved 8 September 2008 from <http://www.autonews.com>
- Skinner, W. (1969). Manufacturing: Missing link in corporate strategy. *Harvard Business Review* 3, 136-145.
- Sturgeon, T. J. (2002). Modular production networks: A new American model of industrial organization. *Industrial and Corporate Change*, 11, 451-496.
- Takeishi, A. (2002). Knowledge partitioning in the interfirm division of labor: The case of automotive product development. *Organization Science*, 13(3), 321-338.
- Ülkü, S., Toktay, L. B., & Yücesan, E. (2005). The impact of outsourced manufacturing on timing of entry in uncertain markets. *Production and Operations Management*, 14(3), 301-314.
- Venkatesan, R. (1992). Strategic sourcing: To make or not to make. *Harvard Business Review*, 70(6), 98-107.

- Vining, A., & Globerman, S. (1999). A conceptual framework for understanding the outsourcing decision. *European Management Journal*, 17(6), 645-654.
- Waterson, P. E., Clegg, C. W., Bolden, R., Pepper, K., Warr, P. B., & Wall, T. D. (1999). The use and effectiveness of modern manufacturing practices: A survey of UK industry. *International Journal of Production Research*, 37(10), 2271-2292.
- Williamson, O. E. (1975). *Markets and hierarchies*. New York: Free Press.
- Williamson, O. E. (1985). *The economic institutions of capitalism: Firms, markets and relational contracting*. New York: Free Press.