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**OUTSOURCING AND ITS IMPACT ON MANUFACTURING  
FLEXIBILITY:  
CONTINGENCIES MATTER**

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## **OUTSOURCING AND ITS IMPACT ON MANUFACTURING FLEXIBILITY: CONTINGENCIES MATTER**

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### **ABSTRACT**

Despite the growing prevalence of outsourcing in manufacturing organizations, research examining how outsourcing impacts different types of flexibility is considerably lacking. This study seeks to advance our understanding of this relatively unexplored relationship by examining how outsourcing influences product, process, volume, and labor flexibilities. To achieve this goal, a mixed case study approach with eleven manufacturing companies that outsourced some portion of their product development or manufacturing activities is used. Our findings indicate that contingencies such as the speed of learning, the accuracy of transfer of learning, absorptive and desorptive capacities, and the distribution of power between the procuring and provider companies determine whether the effects of outsourcing on manufacturing flexibility are positive, negative, or if the type of flexibility is not affected at all. We find that process and product flexibility are impacted mainly positively by outsourcing, while the effects on volume and labor flexibility are ambiguous. A company that decides to outsource must therefore carefully analyze the possible consequences of outsourcing on different flexibility types and in relation to multiple contingencies.

**Keywords:** flexibility, outsourcing, contingency factors, supply chain management, multiple case study

### **INTRODUCTION**

Economic events of 2008-09 have shown that the business environment is volatile and tightly linked across international boundaries. Consolidations of traditional businesses and the collapse of the banking sector added to already existing sources of uncertainties such as increasing globalization of markets, shortening of product life cycles, and demands of ever more

customer-specific products – goods and services. These conditions have forced today's manufacturing companies to continuously rethink their manufacturing strategies and reconsider their outsourcing decisions. The scope of outsourcing has expanded from focusing solely on the procurement of non-core components and services two decades ago, to the outsourcing of every possible activity within the value chain such as (1) production activities at different stages of production; (2) production-supporting activities including research & development, engineering, marketing, quality control, human resource management; and (3) ancillary activities such as inventories management, internal- and distribution- logistics, plant- and machinery- maintenance, and data processing (Chamberland, 2003; Gottfredson *et al.*, 2005; Venkatraman, 2004).

Companies make outsourcing decisions based on the effects that such choices will have on the achievement of their competitive priorities (Kroes & Ghosh, 2009). Considering the generally accepted five competitive priorities of operations strategy - cost, flexibility, quality, time and innovativeness (Deflorin, 2009; Skinner, 1966) - outsourcing has been discussed in the literature as affecting the achievement of each of these priorities.

Cost driven outsourcing decisions are taken if a supplier is able to deliver an activity at lower total costs, after including transaction- costs, and as compared to costs of in-house production (Arnold, 2000; Bienstock & Mentzer, 1999; Fan, 2000; Laarhoven *et al.*, 2000; Vining & Globerman, 1999). The suppliers' lower costs are due to efficiencies from specialization and economies of scale (Arnold, 2000; Bienstock *et al.*, 1999; Fan, 2000; Laarhoven *et al.*, 2000; Vining *et al.*, 1999). Outsourcing can also help save indirect costs for the procuring company through reduced staff, and less infrastructure and support systems (Harler, 2000).

Quality related outsourcing decisions can be viewed from two perspectives: conformance quality and performance quality (Fontes, 2000; Hubbard, 1993). An outsourcing provider may be able to provide higher performance quality, i.e., complete the activity with more features at lower costs than the procuring company (Frohlich & Dixon, 2001). On the other hand, an outsourcing partner may be able to improve the conformance quality of an activity, i.e., provide more dependable output based on superior expertise (Kroes & Ghosh, 2009; Schniederjans *et al.*, 2005).

Time based outsourcing decisions are based on whether the outsourcing partner can complete an activity in a shorter lead time (Schniederjans *et al.*, 2005) or with less cycle time (Narasimhan & Das, 1999). Outsourcing decisions focusing on innovativeness are based on possibilities to access knowledge (Weber *et al.*, 1991) or new technologies (Hoecht & Trott, 2006) not available in house.

While companies outsource activities for different reasons, our focus, in this paper is on the impact of outsourcing on manufacturing flexibility. Flexibility driven outsourcing decisions are made with the aim of enabling procuring companies react quickly to changing customer requirements (Bozarth *et al.*, 1998; Loh & Venkatraman, 1992) in the form of volume fluctuations and changes in product characteristics (Lee, 2002). However, it has been noted that outsourcing can impact flexibility in a positive or negative manner (Schniederjans *et al.*, 2005). While some research supports the notion that outsourcing decreases flexibility (Beaumont & Sohal, 2004; Ettlé & Sethuraman, 2002; Kremic *et al.*, 2006; Lau & Zhang, 2006), other research relates outsourcing to an increase in flexibility (e.g., Beaumont *et al.*, 2004; Embleton & Wright, 1998). These differences in the effects of outsourcing on flexibility may result from different underlying objectives of outsourcing, and subsumed within these different objectives, the different types of flexibility required by the company. In addition, different characteristics of the

environments in which these companies operate may affect the relationships between their outsourcing decisions and the flexibility they are able to achieve. For example, several manufacturing companies distinguish between outsourcing across different phases of the product life cycle (e.g., Lau *et al.*, 2006; Schmenner & Tatikonda, 2005). While all activities are held internally until prototypes achieve production readiness, subsequent manufacturing is outsourced to external providers. Consequently, while activities with high customer contact are conducted in-house so that there is flexibility to react quickly to changes in requirements, activities with low contact are outsourced to increase product and volume flexibility.

While most previous studies relate outsourcing to a broad categorization of flexibility, it is also generally accepted that flexibility is a multi-dimensional concept (D'Souza & Williams, 2000; Hutchison & Das, 2007; Narain *et al.*, 2000; Sethi & Sethi, 1990; Stevenson & Spring, 2007; Suarez *et al.*, 1991). Detailed analysis on the influence of outsourcing on various flexibility types is lacking in the literature. Narasimhan and Das (1999) propose that strategic sourcing should have positive effects on three types of flexibility – modification, volume and new product; they find empirical evidence of a positive direct effect of outsourcing on modification flexibility.

Depending on the environment, we expect differences in the way in which outsourcing impacts each type of manufacturing flexibility. Thus, the goal of this research is to investigate the effects of outsourcing on four types of manufacturing flexibility – volume, product, process, and labor. Further, we explore if there exist any contingency factors moderating the effects of outsourcing on the different types of flexibility.

This paper is organized as follows: In the next section, we review the outsourcing literature to derive motivations for outsourcing related with flexibility. Section three describes

our research method whereas section four exemplifies the impact of outsourcing on flexibility. In section five, we discuss the results, and close the paper with a conclusion, in section six.

## **OUTSOURCING AND FLEXIBILITY**

Outsourcing decisions reflect choices made by companies between building in-house capacities and investing in inventory, versus transferring certain activities outside their boundaries (Stuckey & White, 1993). The phenomenon of outsourcing can be explained based on theoretical perspectives of transaction costs economics (Arrow, 1962; Coase, 1937) and resource-based competition (Penrose, 1959). The context of transaction cost economics theory is described as conditions in which either the market (outsourcing activities) or the organizational hierarchy (in-house production) minimizes total costs (Williamson, 1975). The resource-based view of competitive advantage, on the other hand, states that the success of a company is based on strategically more valuable resources compared to the resources of competitors, and the ability of the company to use such resources better than competitors (Wernerfelt, 1984). An outsourcing decision reflects the choice of a company between conducting an activity using in-house resources, versus buying the activity from an external party; the aim is to gain competitive advantage through such a decision (Holcomb & Hitt, 2007).

The adoption of outsourcing has been related to positive organizational performance in different dimensions such as supply chain performance (Kroes *et al.*, 2009), and leanness and flexibility (Mohammed *et al.*, 2008). However, as mentioned earlier, there are mixed results on the effects of outsourcing on manufacturing flexibility. Note that flexibility, in the context of outsourcing, refers to the concept from the viewpoint of company's customers – i.e. the ability to alter production volumes, mix and product-specifications quickly, and with minimum transition penalties (de Toni & Tonchia, 1998). Early research pointed to a negative relationship between outsourcing and flexibility, going as far as stating that if flexibility is an important consideration,

it is important to not have any contracts with suppliers but keep everything in-house (Mohammed *et al.*, 2008). Such a negative relationship can be attributed to reduction in responsiveness, and risk of alienating customers due to vendors of outsourced goods and services failing to respond in reasonable time to changes in demand (Beaumont *et al.*, 2004; Embleton *et al.*, 1998). Outsourcing companies aim to gain flexibility by procuring from a supplier that has specialized competencies in the outsourced activities, and economies of scope that allow the supplier to change its production quickly and efficiently. However, there may be some loss in flexibility due to the tight coupling that results between the procuring company and its supplier when they have close supply chain relationships (Andrabi *et al.*, 2006; Gietzmann, 1996). Moreover, if the outsourcing partner has purchased some specialized production equipment that is specific for the procuring company, the positive effect of flexibility can be reduced because the freedom of choice for other outsourcing partners does not exist anymore. Lau & Zhang (2006), Kamie & Li (1990), and Bresnen(1994), on the other hand, posit that outsourcing only leads to gains in flexibility. These positive effects of outsourcing on flexibility are discussed later, with specific reference to different types of manufacturing flexibility.

The impact of outsourcing on flexibility, in general, is under investigated in the literature. Researchers in the field of flexibility agree that flexibility is a multi-dimensional concept (e.g., D'Souza *et al.*, 2000; Hutchison *et al.*, 2007; Narain *et al.*, 2000; Sethi *et al.*, 1990; Stevenson *et al.*, 2007; Suarez *et al.*, 1991), and each underlying type of flexibility needs to be analyzed separately to gain meaningful results. Table 1 summarizes the literature on different types of flexibility. Delving deeper into these papers, we found that authors sometimes used different names for the same type of flexibility. Therefore, we not only compared the names given by the authors to the different flexibility types, but also studied the definitions provided by these authors

to explain types of flexibility. As a result, we sometimes sorted a type of flexibility under a different name than that given by the respective author.

Based on a synthesis of this literature, the three biggest groups of manufacturing flexibility that emerge are volume, process, and product flexibility. We also included labor flexibility in our study. Some researchers (e.g., Anderson & Parker, 2002) have proposed that over time, outsourcing may result in a significant decrease in employee capabilities and knowledge base of the outsourcing company. This is especially the case when a company outsources a particular activity completely, not retaining any capacity for the activity in-house. Such a reduction in internal flexibility can result in limiting the ability of the company to cater to changing demands of the outsourcing company's customers. On the other hand outsourcing an activity partially, i.e. conducting that activity in-house to some extent can help internal employees gain from the specialized knowledge of the external providers.

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The following paragraphs provide an overview of existing research related to the specific influence of outsourcing on four types of manufacturing flexibility – volume, product, process, and labor.

*Volume flexibility - The ability of a system to change significantly both the total production level and the composition of the product mix in a relatively short time span, in order to respond quickly to unexpected demand changes (Suarez et al., 1991).*

The relationship between outsourcing and volume flexibility has received substantial attention in the literature. Bresnen (1994) states the possibility to take in external employees to respond to changing market conditions, which leads to an increase in volume flexibility due to the additional employee capacity provided by the temporary hired external employees. Harrison

& Kelley (1993) highlight that volume flexibility has an influence on outsourcing decisions, meaning that companies holding low volume flexibility are more likely to outsource parts of their production than companies holding a high extent of volume flexibility. According to the authors, companies access additional labor capabilities and technologies through outsourcing. The scope of the products in production as well as the resources needed to produce the diversity is evaluated with the belief that the higher these two factors are, the more likely companies are, to outsource parts of the production. Companies holding high volume flexibility do not have the need to outsource as much due to the fact that they can handle diversity better within the own firm boundaries. Suarez et al. (1995) agree with these results after studying the impact of supplier relationships (in terms of outsourcing) on volume flexibility. Jack and Raturi (2002) find mixed results regarding this relationship. One company in their study states that it did not use outsourcing as a source of volume flexibility due to former bad experiences with outsourcing, whereas another company highlights that outsourcing can be a short-term source for volume flexibility, namely by covering demand peaks. In general, the effect of outsourcing on volume flexibility is found to be largely positive.

*Product flexibility - The ease with which new products can be added or substituted for existing products (Abdel-Malek et al., 2000; Das, 1996).*

Based on a review of previous literature, Schmenner & Tatikonda (2005) find that outsourcing helps to foster product experimentation, which leads to a higher variety of products. To the best of our knowledge, this is the only statement linking outsourcing to product flexibility, and it supports the notion that outsourcing activities positively affect product flexibility.

*Process flexibility - Process flexibility of a manufacturing system relates to the set of part types that the system can produce without major set-ups (Narain et al., 2000).*

Lau and Zhang (2006) highlight that outsourcing leads to an increase in flexibility in accessing additional technology and expertise. Kamie & Li (1990) state a higher amount of capacity can be accessed through outsourcing parts of the production, which leads to a gain in flexibility to coordinate production processes. Thus, outsourcing is expected to have a positive effect on process flexibility.

*Labor flexibility - The number and heterogeneity (variety) of tasks/operations a worker can execute without incurring high transition penalties or large changes in performance outcomes (Koste & Malhotra, 1999).*

Bresnen (1994) addresses labor flexibility, which is increased through the outsourcing of some work activities as internal employees gain knowledge from the external providers' workforce. With this in mind, we expect outsourcing to have a positive effect on labor flexibility. As evident from the discussion, the relationships between outsourcing and the specific types of flexibility are discussed only sparsely in the literature. We intend to fill this gap through our empirical investigation.

## **METHODOLOGY**

This research seeks to make a theoretical contribution, as well as help managers make decisions concerning outsourcing as a route toward increasing manufacturing flexibility. Given the multi faceted nature of flexibility, and the differences of environments in which companies operate, we investigate the contingencies that determine whether and how outsourcing affects different flexibilities. We engage in this middle range theory development exercise (Ketokivi, 2006) by studying multiple cases of companies that use outsourcing to different extents, and in different contexts. Our study of the hitherto sketchily researched relationship between

outsourcing and flexibility follows an exploratory research approach (Eisenhardt, 1989; Eisenhardt & Graebner, 2007; Punch, 1998; Stuart *et al.*, 2002; Yin, 1994). Eisenhardt and Graebner (2007) recommend that case studies are particularly suitable for topic areas that are not well documented or defined. Thus, we analyze, in depth, a limited sample of selected cases, consisting of companies that outsource activities with the aim of achieving flexibility. These observations are supplemented with information from additional sources such as extant literature and expert opinions. The company level was selected as our unit of analysis because flexibility needs are considered from an overall company's perspective, even though the immediate results of flexibility gain may accrue in only a part of the company.

### **Sample**

Our sample consists of eleven international manufacturing companies with headquarters either in Switzerland, or in the Principality of Liechtenstein, Western Europe. The two small countries are characterized with high labor costs, and competitive markets. Companies in our sample were selected based on at least some use of outsourcing in the pursuit of manufacturing flexibility, and willingness to participate in research that would require some time commitment and information sharing on their part. In considering the often cited shortcoming of generalizability of qualitative research, we endeavored to put together a sample engaged in different industries. Further, we sought companies with some variation in their environmental characteristics such as dynamism of their industry, level of innovativeness, and requirements to deliver customer specific solutions. As the companies agreed to participate on condition of anonymity, we use pseudonyms – alphabets A through K – to represent each one of them.

Table 2 gives an overview of the participating companies.

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Outsourced manufacturing activities in the participating companies ranged between 15 and 98%, and the most mentioned flexibility goal for outsourcing was an increase in volume flexibility. Product flexibility was the second most popular objective, while labor flexibility was third. None of the companies targeted an increase in process flexibility via outsourcing.

### **Interviews**

The purpose of our interviews was to get in-depth insight into the companies' outsourcing activities, and the resulting effects on their manufacturing flexibilities. Semi-structured interviews were conducted by two researchers (one graduate student and one member of the faculty) from the field of operations management. Respondents from the participating companies included general managers, supply chain managers, manufacturing managers, and purchasing managers, with one respondent representing each company. Interview questions were compiled based on outsourcing and flexibility literatures. An extract of the questions that were used in the interviews is provided in the Appendix. Each interview lasted at least 2 hours, and was recorded and transcribed. To check against any potential bias, the transcripts were returned to the interviewees to check the accuracy of the transcriptions. In some cases, follow up interviews were conducted in order to clarify responses, or to get additional details. The interview data was supplemented by examining other sources including archival data, industry publications, manuals, and company documents.

### **DATA ANALYSIS**

In analyzing the data obtained from the interviews and other sources, we examine the impact of outsourcing on different types of flexibility. In this section, we scrutinize and discuss whether the chosen outsourcing activities appeared to influence each flexibility type – volume, product, process and labor – at the outsourcing company positively, negatively, or not at all.

**Volume flexibility**

*Positive effect.* The ability to adjust volumes to demand, particularly in times of economic upswings, is often subject to the availability of sufficient capacities. The primary volume flexibility advantage of outsourcing comes from the increased capacity that outsourcing firms can access by using external subcontractors. This is because the external subcontractor usually supplies other companies, and thus has greater total capacity. In our sample, five companies – G, H, I, J, and K – increase their volume flexibility by taking advantage of access to additional capacities of subcontractors. Company K's Operations Manager emphasizes that its suppliers can specifically bring forward time-sensitive jobs. *"Given the limited capacity we can maintain internally, the ability to adjust production plans is expanded by entering into outsourcing relationships. The outsourcing partners provide access to additional capacities."*

Another approach to increase volume flexibility through outsourcing is to require suppliers to hold certain levels of inventory for products and components that they supply. In doing so, the suppliers have to commit significant resources to maintain sufficient inventory levels. The costs for this additional capital lockup are factored into the unit prices the procuring company has to pay its outsourcing providers. While the variable costs for the procuring company increase, the company's ability to adjust volumes is significantly improved. The Supply Manager of company D stresses: *"Particularly in times of soaring demand, the inventories maintained by our outsourcing partners provide us with a buffer to fulfill orders in a timely fashion without having to lock up our resources in the form of inventory."* Company E utilizes outsourcing in a similar manner in order to meet its volume promises. As a result, the company's delivery times are far superior to competitive standards. An electro-discharging machine, for instance, is delivered in two to four weeks, which is less than one-third the market average of around three months. This provides company E with a competitive advantage, especially in a

highly dynamic market. Relying on the inventories maintained by its outsourcing providers helps the company to effectively provide the needed volume with these short delivery time standards.

These observations show that companies get positive results for volume flexibility from outsourcing either through a usual buyer-supplier relationship to purchase additional capacity or through a supply chain integration of the providing and the procuring company.

*Negative effect.*

Volume flexibility can be negatively impacted by outsourcing, particularly when orders are time-sensitive and the outsourcing relationship is not of the highest priority to the external provider; in other words, when different companies compete for the production capacity maintained by the provider of the outsourcing services. As company B's Operations Manager remarks: *"This can lead to an actual decrease in volume flexibility"*, (i.e., fluctuations of volume could be better coped with internally). This threat particularly materializes when relationships with third parties are more important for the outsourcing provider than the relationship with the procuring company concerned. In this setting, requirements of third parties will be accommodated before supplying additional capacities for the respective company. This occurs when the business volume with the procuring company is relatively insignificant for the provider, which may result in poor service levels or disregard for special requests of the procuring company.

The Speaker of the Executive Board of company H argues that a company maintaining all its processes internally will, if required by business needs, most likely undertake particular efforts, and temporarily operate above normal capacity in order to meet critical volumes of

important orders. If company H were to subcontract parts of the relevant activities, however, its ability of accomplishing completed orders through this additional effort would be significantly diminished. Particularly, the influence company H's management can exercise over the production processes of its provider may be limited.

Furthermore, external providers are often prevented from adapting their production plans, or processing additional orders due to capacity restrictions and contractual commitments to other companies. As the Head of Supply Chain Management notes, company C particularly experiences these problems in the area of its chassis production. *"In order to request a change in output level, we have to approach our supplier with a lead-time of three months before adjustments can be made. Compared with production processes entirely maintained internally, this leads to a significant loss of flexibility."* Furthermore, the interviewee explains: *"Additional capacities are usually only provided by external suppliers if big lot sizes of standard products are ordered. As we offer customer specific solutions, we have small lot sizes, and changes in the production process are frequent. Outsourcing partners usually do not agree to do this if the batch sizes are small."* Correspondingly, company C's ability to offer varying volumes in times of soaring demand is heavily diminished as a result of outsourcing.

Another factor that leads to a decrease in volume flexibility because of outsourcing is that high capital intensity of production processes makes high utilization of production capacity equally a requirement for the providers of outsourcing services. Correspondingly, the providers are not equipped to adjust to fluctuations in production volumes of procuring firms. In many cases, these adjustments are only possible within certain ranges stipulated in the initial outsourcing agreement.

The provided examples show that outsourcing can impact volume flexibility negatively, if the procuring company is of low importance for the outsourcing provider or if the procuring company and the outsourcing provider are highly co-dependent due to high investments in special equipment of the outsourcing provider.

### **Product flexibility**

#### ***Positive effect.***

When developing new products or changing existing ones, companies need to decide whether they want to invest in building new capabilities, and/or purchase new technologies. Instead of enlarging their own resource base, companies may decide to buy these capabilities or technologies from outside; in other words, outsource certain activities to integrate them later into their own processes. Company G provides an example of such knowledge outsourcing: *"With this, we are able to access additional knowledge from the outsourcing partner, and do not have to develop this knowledge by ourselves."* The Chief Purchasing Officer of company E agrees: *"We not only gain access to the knowledge and capabilities of the external partner but try to translate the knowledge of the outsourcing partner into our own company. Nevertheless, the outsourcing partner stays a valuable partner in adapting the product portfolio to the requirements of the industry dynamisms."* If the company is successful in absorbing the provider's knowledge, the capabilities concerned will be available internally for the company in the future. The potential for acquiring competencies in this manner is enhanced by the provider's specialization, and high level of expertise. Moreover, by providing services to several outsourcing companies, the provider usually acquires experiences in a wide array of problems and can apply these capabilities in other outsourcing relationships. Overall, we found this intention not only in company E, but also in the companies A, B, G, H, I, and K. The General

Supply Manager of company A summarizes this as follows: *"By collaborating with other firms, specific capabilities are developed faster by the outsourcing partner than we could do internally. We thus benefit from the partner's enhanced competency in the field, which in turn strengthens our innovative capacity. Outsourcing in this context has provided us with access to broader experiences in this field and could equally be established in other fields as well."* All companies agree that selecting activities that a subcontractor can conduct better than their own employees are candidates for outsourcing. Companies B, H, and I go a step further and collaborate with their outsourcing partners to take advantage of some of the providers' specialized knowledge for providing their own customers with frequent innovations and specific tailored solutions. Finally, the Operations Manager of company K adds that: *"It is not only a product outsourcing but also an outsourcing of specific technologies. To produce certain products, we need technologies we do not hold in-house but source from outside. With this, we buy certain production processes where we do not want to invest either in the technology or in the training the employees would need to learn how to conduct the production step."*

Another approach to outsourcing for gaining product flexibility is that companies treat their core and non-core activities distinctly when outsourcing. The Procurement Manager of company F states: *"To face the dynamism of the environment, we concentrate our own resources on the core activities whereas boarder activities, which are used to enlarge the existing product portfolio, are outsourced."* By doing so, companies can achieve both a broad portfolio of products and, consequently, concentrate on customer specific solutions, innovations, as well as focused processes in manufacturing. As the data show, companies in our sample subcontract a large proportion of their manufacturing or small parts of their product portfolio. Again, quoting the Procurement Manager of company F: *"Outsourcing has enabled us to offer a broader range of products. This has been accomplished by focusing our resources on the core areas of our*

*product portfolio, innovating new products, and developing solutions for customers while procuring border areas from external providers."* It should be noted, however, that this form of outsourcing solely applies to the fringe areas of company F's product range. These areas are primarily seen as an extension of its portfolio, and do not rely on critical competencies or proprietary technologies.

The case studies show that outsourcing has a positive effect on product flexibility if knowledge from the outsourcing partner can be accessed, if the outsourcing company continues to concentrate on its core activities internally, and if the outsourcing company has absorptive capacities to adapt the knowledge from the provider company.

***Negative effect.***

Procuring companies can encounter difficulties attributable to outsourcing when modifications of existing products become necessary. If changes are required not only in relation to internal processes but also in relation to the processes of external providers, these changes can become highly time-intensive and costly to implement. Company C reported such an outcome from its outsourcing relationships. As the Head Supply Chain Management points out, company C has had to approach its outsourcing partners well in advance whenever modifications are required. When changes are necessary, company C experiences not only an increase of financial expenses and additional coordinative measures becoming necessary, but also the speed with which changes are implemented is significantly reduced. This situation can make the implementation of required modifications more difficult, and leads to a competitive disadvantage in speed. The case of company J illustrates a further challenge. The General Manager of Operations remarks that company J has previously had difficulties when its outsourcing partners turned out to have long learning curves. This resulted in partners requiring significant amounts of

time in order to adapt process structures or respond to company J's specific requirements. Even if company J does not specifically rely on the external provider's competencies in the fields concerned, its product flexibility is still impacted negatively since significant amounts of time and effort have to be committed to equipping its partner with the required competencies.

Outsourcing can also have negative effects on product flexibility as it can create a higher need for coordination. The requirement for coordination between two parties generally mounts as the number of different product variations that are cross-produced increases. Consequently, outsourcing can lead to a firm refraining from expanding its product-range, particularly when the outsourcing relationship extends into the development phase of a product. The Speaker of the Executive Board, describes this phenomenon in the design process of company H's highly customized products. *"For each customer-specific solution, products are jointly developed with our customer in the form of a project organization. During the design phase, the product is developed and continuously improved by repeatedly running through several loops. This approach would not be feasible if we had to involve an external provider because coordination efforts would increase, which would heavily slow down the speed of product development, and increase costs of coordination. Hence, it would no longer be suitable for us to offer the same variety of products we are currently providing."*

Summarizing the findings of our cases, outsourcing has a negative effect on product flexibility if the response time for changes of the outsourcing provider is low and if the outsourcing provider cannot provide the needed capabilities. Furthermore, product flexibility is affected negatively if the coordination effort between the outsourcing and provider companies increases.

### **Process flexibility**

*Positive effect.*

To gain more process flexibility, data show that the interviewed companies intertwine heavily with their outsourcing providers, treating them as partners. Company J aims at having an open culture with its long-lasting outsourcing partners. They discuss process inefficiencies, problems, and bottlenecks with the partners, and adapt best practices from them. This results in improved processes for all involved companies. But it is only possible if both companies have an open culture that allows them to discuss such matters, and when employees are open to accepting suggestions from an outside partner. Company K changes or designs completely new processes by working jointly with its outsourcing partner. This helps smoothen the production process, and harmonizes interfaces with the outsourcing partner. With this, the process flexibility is positively impacted by the outsourcing activities, as company K can decide based on jointly developed processes, which activities stay in-house and which are allocated to the outsourcing partner.

Small companies usually concentrate on a narrow set of competencies. Company D, being a large organization, specifically searches for smaller outsourcing partners that are specialists in certain technologies. With this, company D is able to access to the latest technologies without investing in them. The Supply Manager of company D states: *"We look explicitly for outsourcing partners having technologies which increase the speed of our throughput time. With this, we are able to face the dynamisms of the industry and compete on a high level."*

Another approach adapted by the companies E and F is to gain process flexibility through the design of lean processes. The Chief Purchasing Officer of company E states: *"We define the value adding activities and eliminate needless steps to reduce the complexity of the processes. After this, all non-core activities are outsourced to third parties. The challenge is to define the*

*interfaces to the external partners well to have a smooth process in which just-in-time deliveries are possible."*

As the examples show, outsourcing has a positive effect on process flexibility, if processes of the procuring company and its outsourcing provider are well designed and openly discussed.

***Negative effect.***

A company can also become more rigid in its processes by entering into outsourcing agreements. Specifically, its process flexibility can be negatively impacted since process changes might be hindered by the involvement of an additional party in the relevant processes. Adaptations of the relevant processes then require changes in two organizations, which can slow down or block the restructuring altogether. Company I's Supply Manager specifically describes this phenomenon when referring to the additional coordination required in this situation. *"Depending on the characteristics of the individual relationship, firms can experience significant limitations in terms of their willingness and ability to change."* In addition, the Supply Manager of company D and the Operations Manager of company G both note that process flexibility can also be impacted negatively by outsourcing if the interfaces between the own process and the process of the outsourcing partner is not well defined. *"It is core to very carefully define each step along the interface with the outsourcing provider so that both parties know exactly where their own process starts and where it ends. If this is not done in the beginning, the collaboration will most likely not be successful."*

In contrast to the previous paragraph dealing with positive effects on process flexibility, outsourcing can have a negative effect on process flexibility, if processes of the procuring company and its outsourcing provider are not well designed and openly discussed.

**Labor flexibility***Positive effect.*

By cooperating with specialized suppliers, firms can acquire new capabilities if outsourcing relationships are well structured. Company A accesses the knowledge of its outsourcing partners and increases its own innovative strength. Company D experiences that these competency gains also translate into raising the level of qualifications of its own employees. Thus, outsourcing can enhance the level of qualifications and versatility of employees, which is a decisive characteristic for labor flexibility.

*Negative effect.*

The potentially prolonged learning curve of outsourcing providers has already been mentioned previously. The General Manager Operations identifies this as a key challenge of outsourcing relationships that company J has to face. The problem particularly materializes due to the high degree of innovation and customer specificity for company J's products. According to the General Manager Operations the innovation capacity required for its core areas of activity can only be achieved internally.

Next, if a company outsources completely, a process step or even a whole process, the knowledge of this specific process step and all interfacing steps is lost in the long run as its employees do not follow developments in the market and in research related to those steps. As company A's General Supply Manager and B's Operations Manager remark, the subcontracting company tends to become more specialized by entering into outsourcing agreements. Since certain processes are no longer maintained internally, its available resources are concentrated on a distinct set of activities. Companies A and B experienced that this change also tends to limit the scope of tasks that employees can work on to a more narrowly defined spectrum, and as a result

the procuring company gets completely dependent on the outsourcing provider. Furthermore, innovations cannot be introduced in the same amount as before and new market developments cannot be reacted on due to the lack of internal knowledge in the outsourced activity.

Similarly, retaining a high level of qualification among the workforce can be difficult when outsourcing on a large scale. As the Speaker of the Executive Board emphasizes, its competent and versatile staff is one of company H's key success factors. *"The high level of qualification is particularly required to operate with our fractal structures in production and is systematically developed with recurring training programs. If external companies employed a significant portion of its staff, we would no longer be able to train our employees in the same manner and arrange for such a broad level of tasks and, with this, would lose the ability to solve our customers' specific needs."*

These examples highlight the challenges for maintaining and expanding employees' capabilities within outsourcing engagements, and show that outsourcing can have a negative impact on labor flexibility.

The following table gives an overview of the results from our case studies, and forms the basis for the discussion that follows in the next section.

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Insert Table 3 about here  
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## **DISCUSSION**

Our case studies reveal some contingencies that influence the effect of outsourcing on flexibility. Specifically, these contingencies determine whether flexibility increases or decreases as a consequence of outsourcing. In the following paragraphs, we relate our observations to

existing theoretical perspectives in the literature. This enables us to base our empirical findings in theory, on the basis of which we then develop propositions.

### **Economies of scale and scope**

Economies of scale and scope defined by Chandler (1990) constitute one of the most important theoretical foundations related to decisions about machine capacities. "Economies of scale may be defined initially as those that result when the increased size of a single operating unit producing or distributing a single product reduces the unit cost of production or distribution" (Chandler, 1990, p. 17). Economies of scope on the other hand "are those resulting from the use of processes within a single operating unit to produce or distribute more than one product" (Chandler, 1990, p. 17). Our sample companies aiming for volume flexibility outsource to get additional capacity from their outsourcing providers. As discussed earlier, outsourcing certain parts of the production is worth considering if the outsourcing provider is able to deliver at lower unit costs than the costs that the procuring company would incur for producing the same product in-house. The suppliers' lower costs are due to efficiencies from specialization and economies of scale and/or scope (Arnold, 2000; Bienstock *et al.*, 1999; Fan, 2000; Laarhoven *et al.*, 2000; Vining *et al.*, 1999). Based on this, we propose the following:

*Proposition 1: Volume flexibility increases through outsourcing when an outsourcing provider can offer the outsourced products at lower unit costs based on economies of scale and/or scope.*

### **Organizational learning**

The origin of organizational learning lies in the focus on problem solving, no matter if the organization acts in a stable or dynamic environment. This perspective relates to whether the organization is able to alter its processes to gain better performance or not (Cyert & March, 1963). Over the years, many researchers have worked in the field of organizational learning.

Senge's work (1990) is a cornerstone for relating organizational learning to outsourcing. He stated that any company needs to master five disciplines, namely personal mastery, mental models, shared vision, team learning, and system thinking. The results from our case studies indicate that these five disciplines must not only to be mastered by a single firm but by both, the outsourcing and the provider company. Especially the last three points seem of special importance when dealing with outsourcing. Both companies need to follow the same goals, meaning having a shared vision; the employees of both companies need to be open to share their knowledge and thoughts; and both companies need to employ a systems view for the collaboration between their companies. When all these aspects were in place, our sample companies succeeded in increasing flexibility through outsourcing. When one or more of these aspects were missing, the companies recorded a decrease in flexibility, especially in process flexibility, owing to outsourcing. We therefore propose:

*Proposition 2a: Process flexibility increases through outsourcing when the provider and the procuring company are integrated into one learning organization.*

*Proposition 2b: Process flexibility is negatively affected by outsourcing when the provider and the procuring company do not share the same vision and goals, and are not integrated into one learning organization.*

In the context of the learning organization, not only is the pursuit of congruent goals by the procuring and the providing company of importance, but also the ability of the procuring company to translate, in a reasonable amount of time, tacit knowledge from the provider company into explicit knowledge that it (the procuring company) can absorb. In this context, tacit knowledge is personal knowledge that is held by an employee of the provider company. The knowledge is context specific and is based of former experiences of the respective employee (Nonaka & Takeuchi, 1995). Explicit knowledge, on the other hand, is codified knowledge that can be translated into new processes and products (Nonaka *et al.*, 1995). If the ability to translate

tacit knowledge into explicit knowledge is not well developed, outsourcing might not provide the expected result as the knowledge exchange between partners would not be effective. Our cases provided the insight that especially if the learning curve of the provider company was flat, outsourcing affected flexibility negatively, especially for product and labor flexibility. Following these findings, we propose:

*Proposition 3a: Product flexibility increases through outsourcing when the learning curve of the outsourcing provider is steep, and rapid adaptations of products and processes are implemented.*

*Proposition 3b: Product flexibility is negatively affected by outsourcing when the learning curve of the outsourcing provider is flat, and adaptations of products and processes take long to be implemented.*

*Proposition 4a: Labor flexibility increases through outsourcing when the learning curve of the outsourcing provider is steep, and knowledge of new products and processes is shared between the outsourcing and the providing companies in a timely manner.*

*Proposition 4b: Labor flexibility is negatively affected by outsourcing when the learning curve of the outsourcing provider is flat, and knowledge of new products and processes is not shared between the outsourcing and the providing companies in a timely manner.*

## **Dynamic capabilities**

In addition to organizational learning, dynamic capabilities are of high importance when considering success in gaining flexibility through outsourcing. The dynamic capabilities view, an extension of the resource based theory (Wernerfelt, 1984), is especially applicable when a firm operates in a dynamic and unpredictable environment, requiring the firm to continually revise its routines (March, 1991; Teece *et al.*, 1997). Dynamic capabilities are defined as "a firm's behavioural orientation constantly to integrate, reconfigure, renew and recreate its resources and capabilities and, most importantly, upgrade and reconstruct its core capabilities in response to the changing environment to attain and sustain competitive advantage" (Wang & Ahmed, 2007). In doing so, a firm needs to explore, retain, and exploit its knowledge base inside and outside the

organization (Lichtenthaler & Lichtenthaler, 2009). One dynamic capability relevant for outsourcing is the alliance management capability (Anand & Vassolo, 2002). It is described as the capability to choose fitting and reliable partners with whom the firm can structure relationships that improve performance (Zahra *et al.*, 2006). Based on our case data, the interviewees confirm the importance of alliance managing dynamic capabilities in making successful use of outsourcing to gain flexibilities. More specifically, it is highly important to have an outsourcing provider with whom the outsourcing company can transfer knowledge back and forth.

In allying with other companies, two additional dynamic capabilities are important: absorptive (Jansen *et al.*, 2005; Lane *et al.*, 2006; Lichtenthaler *et al.*, 2009; Zahra & George, 2002) and desorptive capacity (Grant & Baden-Fuller, 2004; Lichtenthaler *et al.*, 2009). Both dynamic capabilities are related to knowledge transfers between companies. While absorptive capacity relates to exploring external knowledge desorptive capacity relates to exploitation of external knowledge (Lichtenthaler *et al.*, 2009).

In our case studies, we frequently observed that companies intended to transfer the knowledge of the outsourcing provider into their own organization in order to gain product and labor flexibility. To be able to do this, the outsourcing provider needs desorptive capacity whereas the procuring company needs absorptive capacity. The outsourcing provider needs to identify the knowledge exploitation necessity of the assimilated knowledge, and subsequently transfer the knowledge to the recipient (Lichtenthaler *et al.*, 2009). The procuring company, on the other hand, needs to acquire the knowledge from the outsourcing provider, assimilate it by incorporating it into its own knowledge base (Lane *et al.*, 2006; Lichtenthaler *et al.*, 2009; Zahra *et al.*, 2002). Thus, we derive the following propositions:

*Proposition 5: Product flexibility increases through outsourcing when the outsourcing provider has desorptive capacities and the procuring company has absorptive capacities.*

*Proposition 6: Labor flexibility increases through outsourcing when the outsourcing provider has desorptive capacities and the procuring company has absorptive capacities.*

### **Asset specificity**

Asset specificity, discussed in the context of transaction cost theory (Coase, 1937; Williamson, 1975, 1985), is understood as a transaction that cannot be redeployed. For Williamson (1975, 1985) asset specificity exists when a transaction-specific asset is a physical and human investment, specialized and unique to a certain task. Originally, asset specificity is dedicated to a buyer-seller relation with the seller, holding the specific asset whereas the buyer has the intention to get access to this asset (Williamson, 1983). When applied to outsourcing, procedural asset specificity is of importance. Here, the workflows and processes of one company are customized to exploit the other company's capabilities (Zaheer & Venkatraman, 1994). As a consequence, flexibility can be lost through outsourcing if one company depends on the other either through the increased risk of having one big customer or supplier, or having a supplier who has invested in equipment solely for the procuring company (Andrabi *et al.*, 2006; Gietzmann, 1996). In our cases, we frequently saw the distribution of power between outsourcing provider and procuring company as an influencing variable for the effect of outsourcing on flexibility. One example is the dependence on the provider when the outsourcing company completely outsourced a certain activity, and thus, lost its own ability to conduct that task. On the other hand, an outsourcing company can become completely dependent on its provider if a new technology sourced from the provider becomes the core technology for an important product of the procuring company. Also, the procuring company becomes excessively dependent on the reaction time of the outsourcing provider for volume adaptations. Thus, when the procuring company only orders

small volumes from the perspective of the provider company, it (procuring company) will be a low priority customer, and thus, not necessarily handled with fast response. We therefore conclude:

*Proposition 7: Labor flexibility decreases through outsourcing when the distribution of power is in favor of the outsourcing provider.*

*Proposition 8: Process flexibility decreases through outsourcing when the distribution of power is in favor of the outsourcing provider.*

*Proposition 9: Volume flexibility decreases through outsourcing when the distribution of power is in favor of the outsourcing provider.*

Table 4 summarizes the influences of outsourcing on the four types of manufacturing flexibility based on the levels of contingency factors.

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 Insert Table 4 about here  
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The overall picture of the effects of outsourcing on flexibility, dependent on contingencies that we empirically observed and theoretically explained, is shown in Figure 1.

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 Insert Figure 1 about here  
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## CONCLUSION

In rapidly changing environments, outsourcing activities are often widely applied with the intention of achieving flexibility. However, research studies conducted so far lacked the specificity needed to analyze the true effects of outsourcing on flexibility as the multidimensionality of flexibility was not accounted for. We contribute to the literature on outsourcing as we derive propositions about the influence of outsourcing on each of the

flexibility types. Further, we explicitly highlight contingencies that moderate the influence of outsourcing on the different flexibilities. The contingencies derived show that outsourcing activities should be analyzed carefully instead of being applied blindly, particularly as different related conditions are needed to be established in order to achieve positive effects on different flexibilities.

Integrating our empirical findings with theoretical perspectives, we show that outsourcing affects the four analyzed types of flexibility differently, depending on contextual contingencies. The questions that companies need to address before seeking manufacturing and product development flexibility advantages through outsourcing are as follows: First, what are the economies of scale and scope for the outsourcing company and its provider? Second, what are the levels of learning capabilities of the organizations that seek to get into outsourcing relationships; how is their ability to absorb and desorb the shared information? Finally, how is the influencing power distributed between the outsourcing provider and the procuring company? These are the contingencies that determine whether outsourcing affects flexibility positively or negatively.

It is important for managers to consider the potential impacts of outsourcing on different flexibilities before they enter into any outsourcing relationships. Further, flexibility needs to be monitored instead of being taken for granted as a benefit of outsourcing partnerships. On the other hand, managers must also examine the impacts on different flexibilities when deciding to terminate any outsourcing relationships and moving the associated production activities in-house.

Overall, this study highlights the importance of examining the outsourcing – flexibility relationship; an area under-examined in the extant literature. This study also emphasizes that researchers should not consider the relationship between flexibility and outsourcing in general.

Instead, flexibility must be decomposed into different types, and examined individually, as should the relationships between types of flexibilities (Hax & Wilde II, 1999).

Our case studies showed another interesting result. In the companies that we studied, the types of outsourcing evolved over time from simple seller-buyer relationships into intertwined partnerships. Our cases revealed that nowadays, many companies ally with their outsourcing partners in order to gain higher levels of flexibility.

This study has its limitations, some of which may also represent excellent opportunities for future research. Our empirical investigation focuses on the outsourcing activities of 11 different manufacturers from Western Europe. Thus, as is common with the case study approach, the generalizability of the findings remains questionable. As a result, applying the findings to organizations outside of this geographic or industrial scope must be approached with caution. To address these limitations, future research should focus on administering survey questionnaires to a wider variety of manufacturers from different countries and industrial sectors. In addition to the mediating variables that we observed in our sample, other potential mediating variables affecting the outsourcing – flexibility relationships should also be identified. The contingencies mentioned by our interviewees should be taken into account in larger scale empirical studies. Such research would provide a more holistic understanding of the outsourcing - flexibility relationship, as well as give a better indication of the internal and external conditions that enable organizations to outsource various aspects of their production processes, and successfully attain high levels of flexibility. In most businesses today, outsourcing is critical for production efficiencies, while flexibility is critical for keeping up with changing market requirements. Thus, their interrelationships continue to be relevant.

## **APPENDIX**

Questions for semi-structured interviews with executives on the topic of whether outsourcing affects certain types of flexibility:

Question
Please describe your strategy and your unique selling proposition
What types of flexibility do you want to increase through outsourcing?
Outsourcing: <ul style="list-style-type: none"> <li>• What activities did you outsource and when?</li> <li>• What percentage of the activity did you outsource?</li> <li>• Can you quantify the amount you sourced out?</li> <li>• What activities do you plan to outsource in the near future?</li> <li>• Are there any activities which are excluded from being considered for outsourcing?</li> </ul>
What motivated or motivates your outsourcing decisions?
What types of flexibility do you expect to increase based on your outsourcing activities?
What organizational form did you decide on for outsourcing (on shore, near shore, off shore, shared service center)?
How do you organize the collaboration with your outsourcing partner?
Assessing the outsourcing result: <ul style="list-style-type: none"> <li>• How satisfied are you in general with our outsourcing success?</li> <li>• Have your general goals been met?</li> <li>• Have your flexibility goals been met?</li> <li>• What problems did occur during and after outsourcing?</li> <li>• Would you make the same decisions if you had to make your outsourcing decisions again?</li> <li>• Do you consider bringing certain outsourced activities in-house?</li> </ul>
Effect of outsourcing on flexibility <ul style="list-style-type: none"> <li>• Have your flexibility goals been met?</li> <li>• Which types of flexibility have been affected by your outsourcing activities?</li> <li>• Have these flexibility types been affected positively or negatively?</li> <li>• What additional flexibility potential do you see through outsourcing?</li> </ul>

**FIGURES**

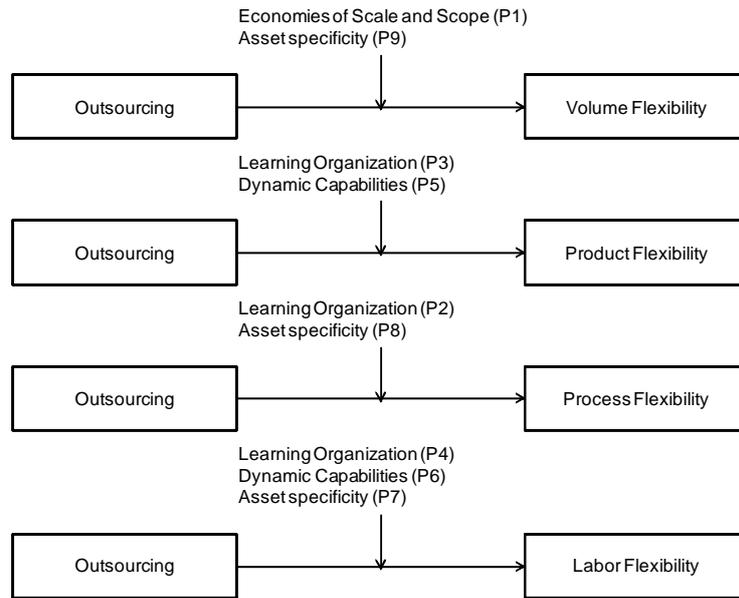


Figure 1: Contingencies influencing the effects of outsourcing on flexibility

**TABLES**

Table 1 : Literature review on flexibility types

Flexibility types Authors	Flexibility types																									
	Volume	Product	Process	Labor	Expansion	New product	Operations	Material handling	Modification	Sequencing	Changeover	Design-change	Market	Material	Program	Rerouting	Action	Automation	Financial	New design	Parts	Procurement	Quality	Responsiveness	State	Structural
Abdel-Malek et al. (2000)	✓	✓	✓																							
Azzone et al. (1987)	✓	✓	✓																							
Barrad et al. (1988)	✓		✓							✓																
Beach et al. (2000)		✓	✓				✓						✓						✓			✓				
Benjaafar (1994)			✓																							
Boyer et al. (1996)			✓																							
Browne et al. (1984)	✓		✓																							
Buzacott (1982)			✓																							
Carter (1986)		✓	✓		✓																					
Chatterjee et al. (1984)		✓	✓																							
Chen et al. (1992)	✓		✓		✓																					
Cox (1989)	✓																									
Das et al. (1993)			✓																							
Dixon (1990)																										
D'Souza & Williams (2000)	✓		✓					✓																		
Frazelle (1982)	✓	✓	✓																							
Gerwin (1982)	✓	✓										✓									✓					



					equipment	
<ul style="list-style-type: none"> <li>• High dynamism of industry</li> <li>• High level of innovativeness</li> </ul>	I	CH	5'400	€ 1.66 bn	25 - Manufacture of fabricated metal products	30%
	H	CH	1'505	€ 202 mio	28 - Manufacture of machinery and equipment s	50%
<ul style="list-style-type: none"> <li>• High dynamism of industry</li> <li>• High requirements for customer specific solutions</li> </ul>	K	CH	3'200	€ 1.23 bn	28 - Manufacture of machinery and equipment s	20%
	J	CH	10'000	€ 515 mio	26 - Manufacture of computer, electronic and optical products	20%

\*CH = Switzerland

\*FL= Principality of Liechtenstein

Table 3: Effects of outsourcing on different types of flexibility

Effect	Empirical observation	Company
<b>Volume flexibility</b>		
Positive	Outsourcing agreements to get access to additional capacity	G, H, I, J, K
	Outsourcing partner holds certain level of inventory as volume buffers	D, E
Negative	Long lead-times before outsourcing partner adjusts capacity for respective firm; no willingness to operate temporarily above capacity	B, C, H
	Product adaptations of certain volumes to customer specific solutions needs to be addressed long in advance to outsourcing provider	C
<b>Product flexibility</b>		
Positive	Possibility to purchase additional capabilities from outsourcing partner and translating competencies of outsourcing partner into own organization	A, B, E, G, H, I, K
	Concentration of own core activities, core products; non-core activities or products are purchased from outsourcing partner	D, F, K
Negative	Product and process adaptations take long to implement due to flat learning curve of outsourcing provider	C, J
	Coordination effort decreases the speed of product development; some requirements would not be addressable anymore	C, H
<b>Process flexibility</b>		
Positive	Develop own processes further in collaboration with outsourcing partner	J, K
	Access to new technologies and/or knowledge through outsourcing	D, I
	Designing lean processes and outsourcing of non-core activities	E, F
Negative	High coordination effort due to the fact that two organizations need to change relevant processes if changes are necessary	D, G, I
<b>Labor flexibility</b>		
Positive	Translating competencies of outsourcing partner into own organization to gain new knowledge	D
	Accessing superior knowledge of outsourcing partner	A
Negative	Innovation potential cannot be gained from outsourcing partner if he has a lower level of knowledge in a certain field or if the learning curve of outsourcing partner is flatter than within own company	J
	Limiting the scope of tasks of internal employees if activities are given away completely in the long-run	A, B, H, J

Table 4: Influences on the effect of outsourcing on flexibility

Contingency	Flexibility Type	Company	Proposition
Economies of scale and scope	Volume Flexibility	G, H, I, J, K	Proposition 1
Learning organization	Process Flexibility	J, K	Proposition 2
	Product Flexibility	C, J	Proposition 3
	Labor Flexibility	J	Proposition 4
Dynamic capabilities	Product Flexibility	A, B, E, G, H, I, K	Proposition 5
	Labor Flexibility	D	Proposition 6
Asset specificity	Labor Flexibility	A, B, H, J	Proposition 7
	Process Flexibility	D, I	Proposition 8
	Volume Flexibility	B, C, H	Proposition 9

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