UNIVERSITY OF GOTHENBURG

SCHOOL OF BUSINESS, ECONOMICS AND LAW

The outsourcing process in an R&D context

- A Case Study at GKN Aerospace and Volvo Cars

Bachelor's Thesis in Industrial and Financial Management

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Abstract

Purpose: According to several researchers, outsourcing of R&D activities is on the rise. The outsourcing process in an R&D context differs from other traditional types of outsourcing since it often takes the shape of a project based nature and is therefore generally limited both in time and product quantity (test products, prototypes). Furthermore, outsourcing of R&D activities often involves extended collaboration, innovation, newly developed technology and complicated solutions. Hence, the main objective of this thesis is to build an increased understanding of the outsourcing process in an R&D context by taking on a holistic point of view.

Methodology: The research is based on a qualitative case study conducted at GKN Aerospace Sweden AB and Volvo Cars AB.

Findings: The two firms' way of operating exhibit some major differences, the main being flexibility. The differences stem from the fact that Volvo is an OEM whereas GKN is a first-tier supplier. GKN's outsourcing methods are agile and of an ad hoc character, whereas Volvo's are rigid and institutionalized. We argue that both firms would probably benefit from finding balance between these two types of outsourcing methods. Furthermore, the difference in flexibility is also a result of operating in separate industries, firm size and organizational structures.

Contribution: The thesis contributes to previous literature by describing the outsourcing process in an R&D context from a holistic point of view. By doing so, a number of key elements are distinguished which are apparent and interrelated throughout the whole outsourcing process. Finally, it's perceived that certain outsourcing literature seems to be less relevant in an R&D context.

Key words: IOCM, NPD, OBA, Opportunism, Outsourcing, R&D, SD, Trust, Uncertainty.

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Vladimir Adzic Daniel Ridley

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Abbreviations

For the convenience of the reader, abbreviations that are recurring throughout the thesis are listed below.

IOCM - Interorganizational cost management

NPD - New product development

OBA - Open book accounting

OEM - Original equipment manufacturer

R&D - Research and development

SD - Supplier development

1 Introduction

The background serves to illustrate the main theme of the thesis as the terms outsourcing and R&D are first defined and placed into a broad perspective. The problem discussion delves deeper into what problem is faced, whom this problem may concern and how the thesis intends to answer the problem. Lastly a research question is presented, followed by the objective, purpose and delimitations.

1.1 Background

Firms constantly must deal with the decision of whether to invest resources to produce needed products and services internally, or to buy them from an external supplier (Power, Desouza & Bonifazi, 2006; Dolgui & Proth, 2013). When a firm decides to buy, it is engaging in outsourcing. The Oxford dictionary of Business and Management (2016) defines outsourcing as *"The buying in of components, sub-assemblies, finished products, and services from outside suppliers rather than by supplying them internally".* According to Power et al., (2006) outsourcing is booming in almost every industry, partly due to globalization, growing competition and need for faster time-to-market.

If a firm seeks to develop a new product or service, the technology needed for development may be available on the market and can be acquired at a price. However, it may also be the case that technology and knowledge are absent from the market (Maurer, 1995). To design and develop new products or services in such a scenario a company may need to take part in R&D activities. For this thesis, the industrial definition of R&D by Maurer (1995. p.1244) is used. He defines it as *"To obtain new knowledge applicable to the company's business needs that eventually will result in new or improved products, processes, systems, or services that can increase the company's sales or profits".*

Conducting R&D in-house has its benefits, among them are that the company is the sole owner of the knowledge attained from a project which can be absorbed to gain competitive advantages (Maurer, 1995). Furthermore, technology derived from R&D may be kept within the company and away from competitors (ibid.). Despite these advantages, outsourcing of knowledge-intensive work is increasing at an astonishing rate (Power, Desouza & Bonifazi, 2006; Lai & Wang, 2009; Martinez-Noya & Garcia-Canal, 2014).

Not long ago, it was very rare that firms would outsource R&D activities. Today this is fairly common, even when R&D is considered a core competence (Power et al., 2006). The rationale is that firms should seek out and form alliances with companies that have mature processes in place if that generates added value (ibid.). Ethier and Markusen (1996) argue that outsourcing R&D activities may lead to faster innovation as a supplying firm might have greater knowledge, technology or capacity.

This thesis aims to explore the outsourcing process in an R&D context. By process we mean the chain of events starting with a firm deciding whether to outsource or not, to the stage where the actual outsourcing takes place. By R&D context we mean that the outsourcing process in some way involves research and development of some sort.

1.2 Problem Discussion

The outsourcing process in an R&D context differs from other traditional types of outsourcing in several ways. Here we use the term traditional for, in our opinion, the more common types of outsourcing. For instance, in contrast to traditional long term full scale production procurement, the outsourcing process of R&D activities often takes the shape of a project based nature and is therefore generally limited both in time and product quantity (test products, prototypes). Another difference compared to the traditional occasional contract manufacturing, for example when a supplying firm produces a limited number of goods by strictly following a blueprint or other specifications, is that outsourcing of R&D activities often involves extended collaboration, innovation, newly developed technology and complicated solutions. For instance, firms that perform R&D often explore unknown technological territories, sometimes even lacking a clear objective. We argue that uncertainty, extended collaboration and mutual trust are some of the key characteristics that set outsourcing of R&D activities apart from other types of traditional outsourcing. Traditional outsourcing is a complex procedure on its own as two or more separate organizations need to work together and coordinate their interests. When adding other factors such as increased uncertainty, deeper collaboration and the need of greater mutual trust, we argue that this makes the outsourcing process substantially more complicated and is therefore an interesting field to study in our opinion.

However, since literature dedicated to outsourcing in an R&D context is rather scarce, we mainly derive from research that often focus on traditional outsourcing. Documented research

on traditional outsourcing is comprehensive and covered especially in the purchasing, supply chain and management literature. For instance, Williamson (1979) discusses how transaction costs and uncertainty influence a firm's decision whether to outsource or to vertically integrate manufacturing. Quinn and Hilmer (1994) argue that activities which are considered a firm's core competence should not be outsourced, since they might lead to a loss of competitive advantages. Oshri, Kotlarsky and Gerbasi (2015) highlight the importance of contracts and negotiation when engaging suppliers. Jones (2004) discusses trust and how opportunistic behaviour may influence an outsourcing project. Cooper and Slagmulder (1999) emphasise the importance of interorganizational cost management (IOCM) in joint ventures. Agndal and Nilsson (2009) argue that open book accounting (OBA), meaning cost transparency, is of great importance for managing costs during outsourcing. Gulati and Sytch (2008) argue that one of the most important factors of outsourcing is the relationship between the cooperating firms. Lawson, Krause and Potter (2015) suggest how supplier development (SD) leads to increased benefits for both firms when cooperating in an outsourcing project.

The examples above are fragments from a large body of literature concerning outsourcing. Most literature discuss a specific part, stage, subject or phenomena of the outsourcing process in an isolated manner. R&D is indeed mentioned every now and then, but for the most part relatively brief and superficial. We argue that the absence of literature describing the outsourcing process in a R&D context as a whole makes it difficult for potential researchers to grasp and analyse such a process. Similarly, we argue that there seems to exist a demand from practitioners to better understand the process in order to be able to manage it successfully. Therefore, the main objective of this thesis is to build an increased understanding of the outsourcing process in an R&D context. By taking on a holistic point of view, we contribute to existing literature by shedding light on a complex and relatively unexplored field of outsourcing. We hope that this thesis will both help and stimulate further studies by future researchers.

We intend to explore how outsourcing of R&D activities are conducted at two Swedish manufacturing firms and why these processes are conducted the way they are. The chosen firms for our case study are GKN Aerospace (GKN) and Volvo Cars (Volvo). Both firms are engaged in outsourcing of R&D activities of some sort. According to a Procurement Manager at GKN (personal correspondence, 2016-10-25) the firm is engaged in several R&D-projects which are typically initiated and co-financed by the European Union. When dealing with

suppliers in these projects there are several areas in need of improvement. Two such examples are cost management and organizational differences (ibid). A Senior R&D Manager at Volvo (personal correspondence, 2016-11-28) states that the most common type of R&D is performed in cooperation with system suppliers. These are the firms that provide mass produced components to Volvo's and other car manufacturer's assembly lines. Although system suppliers may provide high quality and cost effective products, in many cases they do not deliver optimal solutions. Volvo are therefore currently investigating its opportunities to increase added value by outsourcing a few R&D projects where a developing supplier is contracted to develop fully customized solutions. This type of outsourcing is new to Volvo but will most likely increase in the future (ibid).

1.3 Research Question

The main research question is formulated as:

- *How are GKN's and Volvo's outsourcing processes conducted in an R&D context and why?*

The sub-questions are formulated as:

- *What are the main differences and similarities between the two studied firms and why?*
- *What elements in the outsourcing process can be identified as key factors?*

1.4 Delimitations

Although this thesis aims to explore and explain a holistic view of the outsourcing process regarding R&D, there are aspects which may be important that have been left out due to a time limit and other practical constraints. The included content is a consolidation of subjectively chosen segments derived from the conducted interviews. Examples of parts that may be relevant but not included in this thesis are risk management, termination of contracts, project management and legal implications. Furthermore, it is important to understand that when discussing GKN and Volvo we are not necessarily referring to the businesses as entities, but rather as the departments included in our empirical studies.

2 Methodology

This section describes which research strategy and design were chosen as well as how data was collected and analysed. It further describes our method for conducting a literature review. Finally, there is as discussion regarding validity, reliability and a reflection on the chosen methodology.

2.1 Research Strategy

An inductive and interpretive study approach was used as the nature of the thesis is investigative and explanatory. The research strategy best fitting for such a study is a qualitative research method according to Bryman and Bell (2013). This thesis places emphasis on words and subjective views from persons in a particular environment. Due to the fact that emphasis is placed on words and views rather than numbers, a statistical quantitative research strategy would not yield desirable results. The inductive theoretical view was based on introductory meetings with senior staff at two firms, a general theoretical framework was initiated based on these interviews. As the thesis progressed and further interviews were held a more extensive framework was established.

2.2 Research Design

In regard to the research question, the most relevant method of approach was to perform a case study. A case study enables a more comprehensive analysis of the research problem than a broad statistical survey (Bryman and Bell, 2013). Traditional understanding of case studies sometimes undermines their suitability for research, such as there being little ability to generalise from their conclusions (see, e.g., Campbell & Stanley, 1966). Case studies are however a means for a researcher to gain a deeper understanding of an environment, field or phenomena (Flyvbjerg, 2006). The case study was performed by examining two firms which identified with the problem description and were relevant in regard to the research question. The two studied firms, Volvo Cars and GKN Aerospace (GKN) are both engaged in R&D in their respective industries.

GKN is an important actor in the aerospace industry. In fact, 90% of all commercial aircraft that take off every day do so with technology on board provided by GKN Aerospace Engine Systems (GKN Aerospace, 2017). The firm employs around 2000 people at its head office in Trollhättan and has an annual turnover of approximately 6 billion SEK (GKN Aerospace,

2016). According to a Procurement Manager at GKN (personal correspondence, 2016-10-25), the main business consists of designing and manufacturing components for various commercial and military airplane engines as well as components for space shuttles.

Volvo Cars designs, constructs and manufactures cars in the premium segment and is owned by Zhejiang Geely Holding. The head office is located in Gothenburg where both manufacturing and R&D take place. During the first two quarters of 2016 the company sold over 250,000 cars, boosting its sales volume by 10,5% compared to the same period the previous year. Operating income between January and June 2016 was 5,59 MSEK, resulting in an improvement of the operating margin by 4,5% compared to the same period in 2015 (Volvo, 2016). According to a Senior R&D Manager (personal correspondence, 2016-11-28), R&D is crucial for the survival of the company. Some projects are conducted as Advanced Engineering. Here the objective is to test and understand new technologies which may not always lead to industrialization.

2.3 Data Collection

2.3.1 Primary data

Primary data was collected through unstructured and semi-structured qualitative interviews with employees at GKN Aerospace and Volvo Cars. Interviews were carried out with seven members of staff, four from GKN and three from Volvo, in sole- and joint interviews. All respondents were involved in R&D projects in some form. There were in total nine interviews conducted, spanning in length from 30-90 minutes. After initial contact with the participating firms a problem description was sent out and an introductory interview was held with a Procurement Manager at GKN and a Senior R&D Manager at Volvo. The initial interview was unstructured and the respondent was able to associate freely while the researchers asked general follow up questions when needed. After an introductory interview the researchers had a better understanding of the general problems perceived by managers in R&D projects. Both participating firms found the pending research interesting and important to their respective situations and were eager to cooperate further. A more extensive literature review was conducted in regard to what had been discussed during the initial interview. Thereafter, other members of staff in both studied firms were interviewed.

The following respondents participated in the study:

GKN	Volvo
Procurement Manager	Senior R&D Manager
Director of Supply Chain	Senior Purchasing Manager
Controller	Senior Buyer
Director of Operations	

The interviews were held in a semi-structured setting. All interviews were held where the respondent was in their natural setting which per Creswell (2007, 2014) is a way of ensuring that the respondent feels comfortable and may lead more nuanced answers. Prior to these interviews an interview guide was established (see Appendix 1) with several areas of focus. The questions in the interview guide were designed with the research question in mind without being too specific. Questions which are too specific may inhibit alternative views or analysis (Bryman & Bell, 2013). All interviews were audio recorded, which allowed the researchers to be able to focus on the interview and its nuances rather than taking notes. Furthermore, an audio recording captures information which was not anticipated such as answers from follow up questions or a reflection outside of the interview guide.

2.3.2 Secondary data

Secondary data used in this report consists mainly of peer reviewed articles and books relevant to the area of research. Articles were acquired by using the University of Gothenburg's library, Gupea and Google Scholar. Books were sought out at the University of Gothenburg's library. Other sources of secondary data were collected directly from GKN Aerospace and Volvo Cars such as internal R&D project-related documents.

2.3.3 Data processing and analysis

All conducted interviews were transcribed and the data was broken into categories for analysis. The categories chosen for analysis evolved over time as more data was collected and new problem areas arose. As further interviews were held three outsourcing phases for data processing were identified. These three phases were the *strategic phase*, the *transitional phase* and the *operational phase*. Within each phase were also identified key elements. Many aspects were discussed and described by the respondents, however, it was these phases which stood out. The collected data was encoded with a specific phase and broken into which element of that phase it was relevant to. In some cases, collected data belonged to several phases and many different elements and was then analysed in each context. The theoretical framework which consisted of the three phases and each element was cross referenced with the collected data. Through cross referencing the framework with the data we were able to make a comprehensive analysis of each phase in the outsourcing process. A conceptual model of the research process is illustrated above. The model serves to depict the flow of how gathered information is used to conduct a literature review, build a theoretical framework and analyse empirical evidence.

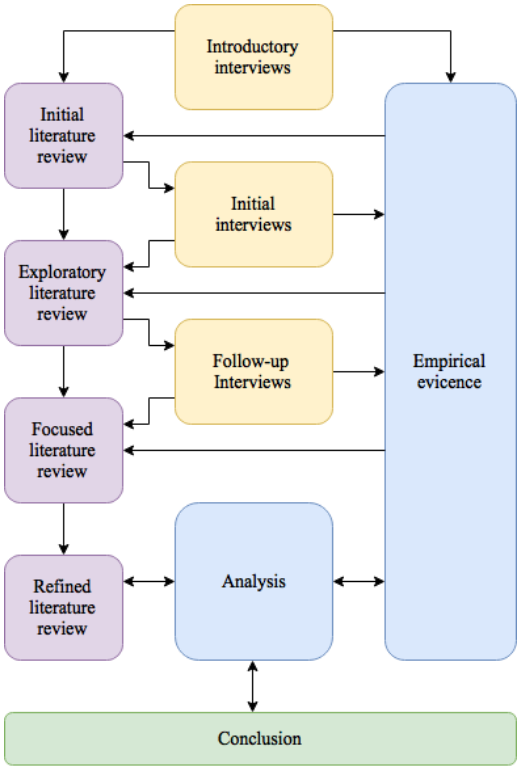
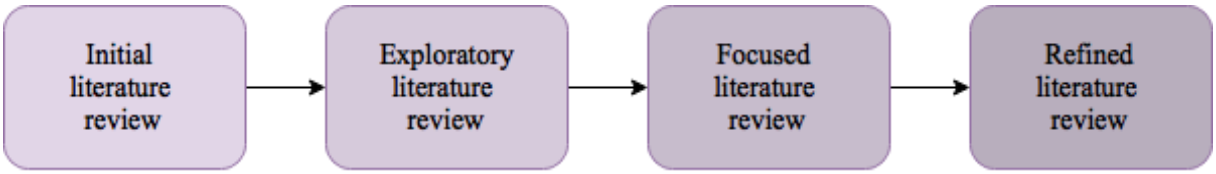


Figure 1 (Adzic & Ridley, 2017)

2.4 Method for Literature Review

The method for the literature review was based on a model by Liston (2006) as seen below.

Figure 2 (Adzic & Ridley, 2017) based on Liston (2006)



The first step was an initial exploration of the field of study by using our case study in combination with introductory interviews. As more interviews were held the field of study was explored more extensively. Focus was then placed on literature more relevant to the research question and collected data. Finally, after focusing the literature review it was refined and a relevant bibliography was established.

Keywords and terms used while searching for relevant literature were: *outsourcing, research and development, transaction cost, core competence, open book accounting, trust, specification, contract, opportunism, cost management, relationship management, supplier development and customer-supplier relationship*. Several spelling variations were used for the keywords in order to minimize the chance of missing relevant literature. A large body of literature was uncovered for different research areas and theories connected to the research question, at points the literature was overlapping.

2.5 Validity and Reliability

Bryman and Bell (2013) state that validity concerns how a researcher identifies, observes and measures what is to be surveyed. All interviews were audio recorded and transcribed. Furthermore, all interviews were conducted in a similar fashion by using an interview guide. According to Bryman and Bell (2013) an interview guide is suited for situations where several persons are interviewed at different times. The authors also imply that using an interview guide will help the researchers in the process of transcribing and comparing interviews. Respondents were offered to review a summary of the report and verify that what was said during the interviews was interpreted correctly. Different data sources were compared in order to increase validity and to look for themes which were then used to compile a theoretical framework. While recounting findings a rich description was used to convey as

closely as possible the experience of the researchers. However, conclusions are based upon subjective world views from persons exposed to an environment at a certain point in time. These views are further analysed by two researchers who may be biased after long exposure to the thesis. This could imply that a different researcher exposed to the same information may interpret the data in another way.

Reliability refers to how readily a study can be reconducted and achieve the same results (Bryman & Bell, 2013). As with most qualitative research it is hard to replicate this study exactly due to the fact that it is impossible to freeze an environment in its current state (Bryman & Bell, 2013). Steps have however been taken to increase the reliability of this thesis. Interviews have been conducted with several staff members of the two studied firms. In this way, we may have uncovered a broader view and understanding of where people with knowledge of the problem area agree, disagree or are uncertain. There have also been in depth discussions between the authors regarding the subjectivity of the thesis. An agreement upon how to categorize collected data in order to conduct an analysis was made at an early stage during the process. These steps will, according to Bryman and Bell (2013), increase the compliance of analysis and by extension also inter-rater reliability.

2.6 Method Reflection and Source Criticism

Using audio recordings may inhibit some interviewees from giving nuanced answers if they feel uncomfortable being recorded. There could also be vital information left out of answers, intentionally or not, which has to be taken into account. The subjective experience of the researchers is that we did not feel that any of the interviewees felt uncomfortable when asked if they complied with being audio recorded, this does not however promise that it in fact was so. Furthermore, interviews were held in Swedish, transcribed and translated into English. This could suggest that some nuances may be lost in translation.

The small number of researched firms could make the findings difficult to generalise as the conclusions may not represent the population as a whole, this could lower reliability. Keeping the number of interviewees at a fairly low level may however allow a researcher to delve deeper into the problem thus perhaps making the results more generalizable. Having more respondents could have made the analysis shallow given the time constraints as there would not be enough time to conduct an analysis of a grander scale.

The sources used in this thesis consist of peer reviewed articles, university textbooks and first-hand interviews with persons working in the field who are associated with the research problem. We feel that the articles and textbooks take an objective standpoint and are reliable over time. When it comes to the respondents the subjective view of the authors is that the answers given were sincere and objective. There will however always be some form of subjectivity involved due to the fact that the respondents are describing their experience of an environment

3 Theoretical Framework

The theoretical framework is divided into three main parts. Each part represents a phase in the outsourcing process. The first phase deals with the strategic aspect of outsourcing. The second phase concerns transitional aspects while the third phase regards the operational stage in the outsourcing process. It is important to keep in mind that outsourcing in practice may not be as sequential or straightforward as in theory. Furthermore, the boundaries of each phase may not always be clear and might be overlapping at times. There may also be times where certain elements belong to several phases, even if only described once.

3.1 Strategic Phase

The strategic phase of outsourcing concerns three important questions: (1) Why should a firm outsource? (2) What should a firm outsource? (3) To whom should a firm outsource?

3.1.1 Why should a firm outsource?

According to Dolgui and Proth (2013), when in the process of NPD, a firm faces two questions. These are: (1) Should the firm manufacture internally or should it engage in outsourcing? (2) What are the benefits and pitfalls if the firm should choose to outsource?

When it comes to NPD, suppliers have come to play an increasingly important role for manufacturing firms (see, e.g., Eisenhardt & Tabrizi, 1995; Ulset, 1996; Krause et al., 1998; Helander & Möller, 2008; Weeks & Feeny, 2008; Lawson et al., 2015; Oshri et al., 2015). Increased international competition combined with technological advances and shorter product lifecycles has led firms to reduce personnel and focus on core competencies (Routroy & Pradhan, 2013). Generally, cost reduction is seen as the greatest benefit of outsourcing (Quinn, 2000). However, according to Momme (2002), buyers have switched focus from outsourcing being mainly a means for reducing costs, to also be able to gain flexibility, customization, innovation and fast time to market capabilities.

Another benefit of outsourcing is the potential to free up cash. This way a firm can focus on investing in its core activities while efficiently benefitting from a supplier's knowledge, optimal equipment and experience (Weele, 2010). According to Oshri et al. (2015), involving an independent third party can also lead to knowledge spill overs and may reduce the possibilities of introvert short-sightedness in the company. Furthermore, Weele (2010) argues

that an outsourcing firm may increase flexibility so that fluctuations in workload can be absorbed more effectively. Dolgui and Proth (2013) assert that other theoretical benefits of outsourcing include freeing up personnel to focus on core competencies, gaining access to knowledge otherwise not attainable, higher quality outputs and lower costs.

There are potential pitfalls to outsourcing as well. Dolgui and Proth (2013) discuss several such pitfalls in their article, a couple of which are described briefly below (for an in-depth analysis see, Dolgui & Proth, 2013). *The dilemma of competition*: When two firms collaborate, there will be links created between them, for example technical data and knowledge exchange. Although this initial exchange of information may not be harmful to a buying firm, there could be a risk of a supplier gaining access to core competencies. This is due to the fact that there may be difficulty in keeping barriers between firms in close collaborations. *Loss of initiative by the buyer*: When outsourcing parts of NPD, in particular R&D activities, there could be a shift in power toward the supplier. If a supplier is included in an activity, all changes in this activity must first be recognised and accepted by the supplier. This will in turn lead to diminishing freedom for the buying firm. There could also be a risk that dependencies shift from bilateral to unilateral when a supplier gains a lot of firm-specific knowledge (Ulset, 1996; Weeks & Feeny, 2008; Oshri et al., 2015).

3.1.2 What should a firm outsource?

Previous research often discusses two approaches to determine what activities should be outsourced, the *transaction based approach* and the *core competence approach*.

A transaction cost is the cost associated with an exchange between two parties. An example of a transaction cost could be loss of control or technology leakage (Ulset, 1996). An underlying assumption in transaction cost theory according to Weele (2010) is that a transaction between two parties is based on a contract. Williamson (1981) wrote that the decision whether or not to outsource and the degree to which outsourcing may occur is related to transaction costs. The goal being to end up at the lowest possible cost for each transaction. Williamson (1981) goes on to discuss transaction cost analysis and the consequences of a firm's choice whether to outsource an activity or not are analysed.

The amount of transaction costs depends on three factors according to Ellram and Billington (2001), these factors are:

I. The frequency of the transaction;
II. The level of transaction specific investments;
III. The external and internal uncertainty.

Transaction costs will increase as the frequency of transitions grows. The same can be said for the relationship between transaction costs and the level of transaction specific investments (Weele, 2010). A reason for this could be that these types of investments are often "one of a kind" and specific to a relationship, an example of this given could be moulds in the aerospace industry.

Williamson (1979) argues that the efficiency of a contract in an interorganizational exchange is associated with the level of uncertainty. There are two types of uncertainty, external and internal uncertainty. External uncertainty refers to market uncertainty. Williamson (1979) describes uncertainty as the inability to predict contingencies that may occur. An example of a market with high uncertainty is one where technological advances are high, such as R&D in manufacturing firms. As external uncertainty increases, so will the level to which operating firms integrate vertically (ibid.). According to Ellram and Billington (2001) internal uncertainty considers the fact that a firm may not completely know what it wants, an example of this is R&D projects where projects may evolve or change direction. It may also be difficult to assert whether or not a contract has been fulfilled and contracts may be incomplete.

An assumption behind the core competence approach is that a firm should concentrate on its core competencies to create or maintain competitive advantage. Furthermore, the core competencies should create unique value for a customer, all other activities should be outsourced (Quinn & Hilmer, 1994). There seems to be a consensus that a firm's core competencies should not be outsourced (Quinn & Hilmer, 1994; Arnold, 2000). Idiosyncrasies of core competencies are according to Quinn and Hilmer (1994) skills or knowledge, limited in number and unique value adding activities.

Weele (2010) argues that the idiosyncrasies of core competencies must give a firm long-term advantage over its rivals and that these competencies must be well protected. Arnold (2000) suggests that there are four different activities on which outsourcing decisions are based. Arnold's framework is based on Quinn and Hilmer's (1994) work on outsourcing models. The four activities are: (1) Company core activities; (2) Close-core activities; (3) Core distinct activities; (4) Disposable activities.

Arnold (2000) proposes that there is a gradualism to which activities should be outsourced. Company core activities should not be outsourced whereas disposable activities should. Activities two and three are subject to more ambiguity regarding whether or not they should be outsourced as they are more situation-based than activity one and four.

3.1.3 To whom should a firm outsource?

When a decision has been made to engage in outsourcing, the next main step is to select an appropriate supplier. One important factor in the selection process is the supplier's technical and managerial competence, which should be greater than the buying firm's if the outsourcing procedure is to add value according to Weele (2010).

Since offers from different suppliers might be derived from different solutions, it is a challenging task for buyers to make the offers comparable in an evaluation and selection process. In such cases, a suppliers' cost data can play an important role since it can help the buyer in understanding what grounds an offer is based upon (Rajagopal and Bernard, 1994; Seal et al., 1999). According to Agndal and Nilsson (2009) the selection process is not necessarily about choosing the supplier that offers the lowest price. Instead, given certain financial constraints, the process often deals with choosing a supplier *"whose business processes and suggested solutions offer the best possibilities of becoming integrated with the processes and solutions of the buyer" (ibid. p. 88)*. Axelsson and Wynstra (2002) adopt a similar view and argue that choosing a supplier is to a high degree a matter of a matching process, where the buyer compares its needs to a supplier's capabilities.

Extant research suggests that the relationship between a buyer and supplier might be the most important factor during an outsourcing activity in highly technological and dynamic environments, such as R&D (Cullen, Johnson & Sakano, 2000; Kedia & Lahiri, 2007; Gulati & Sytch, 2008). Furthermore, it is suggested that a particular amount of trust is needed to

perform outsourcing activities (Gulati & Sytch, 2008). In this thesis focus is placed on relational trust, defined by Gulati and Sytch (2008. p. 167) as *"The expectation that another organization can be relied on to fulfil its obligations, to behave in a predictable manner, and to act and negotiate fairly even when the possibility of opportunism is present"*. Prior research indicates that interoganizational and interpersonal trust generate lower negotiation and governance costs, enhance collaboration and reduce conflict (Zaheer, McEvily & Perrone, 1998; Gulati & Sytch, 2008).

In accordance, Cullen et al., (2000) argue that trust is an essential part of successful interorganizational activities and relationships, regarding both collaboration with partners overseas and on home soil. According to Kedia and Lahiri (2007) buyers need to trust that their supplier will conform with their expectations when it comes to confidentiality, security of sensitive information and to not display any form of opportunistic behaviour. Furthermore, the authors argue that trusting that suppliers have the capability to deliver on time, with the right quality, compliance with legal standards and have long term resource stability are of importance. Without trust in these important areas, there will be great difficulty in maintaining a business relationship (ibid.). Badir (2015) argues that there is however not always time for firms to wait for a high amount of trust to develop when dealing with a new supplier as it might impede their chance of getting a product ready for a specific project or to market on time.

Overseas outsourcing comes with a set of benefits but also drawbacks. Benefits from overseas outsourcing may include lower costs, increased flexibility and access to knowledge which may not be acquirable on home soil. Important to keep in mind is that business atmosphere and cultural differences of the host country always have some kind of impact on the outsourcing process (Rilla & Squicciarini, 2011). Kedia and Lahiri (2007) list several factors which may affect an overseas relationship. For instance, interpersonal interaction, values and norms and attitudes toward technology. Winkler, Dibbern and Heinzl (2008) argue that drawbacks when outsourcing offshore may be that suppliers are used to working with precise and detailed specifications and are reluctant to work with poorly defined specifications as often is the case in R&D projects.

Working with a supplier may lead to outbound knowledge spill overs. In some cases, the spill overs might even involve the buyer's core competences. This opens up for a potential threat,

since there is a chance that a supplier can in fact become a future competitor (Arruñada & Vázquez, 2006; Rossetti & Choi, 2008; Dolugi & Proth, 2013).

3.2 Transitional Phase

The transition phase concerns deciding on how and under what conditions the outsourcing process will be conducted. Product specification and contract negotiation are critical activities during the transition phase.

3.2.1 Specifications

According to the Oxford Dictionary of Mechanical Engineering (2013), a specification is defined as "*A document giving all relevant technical information about a device, machine, system, etc., for example dimensions, weight, power output, torque, emissions levels, load-carrying capacity, fuel consumption, fuel capacity, and lubrication requirements"*.

Nellore and Söderquist (2000) distinguish between a narrow-based and broad-based definition. The authors see the definition from the Oxford Dictionary as a narrow-based, whereas a broad-based definition *"would consider the specification process, where the written document called the specification is seen as an open arena for joint discussion between the OEM and the suppliers" (ibid. p. 529)*. A broad-based view of a specification is subsequently more flexible and dynamic as not only the description of a product is encompassed but also the process of reaching the final document (Nellore & Söderquist, 2000). The authors go on to argue that in cases where there is a lot of uncertainty, such as R&D a broad-based specification will be used.

3.2.2 Contracts and opportunistic behaviour

A contract is a legal document which makes the relationship between a buyer and seller formal in the sense that each party must comply according to specified terms and conditions. The more complex an outsourced activity is, the more complicated the contracting environment and the relationship between a buyer and seller get. An effort to cover all future eventualities that might occur in such situations can be very time consuming and expensive, for instance due to challenging negotiations and the need of legal consulting (Baye & Prince, 2014).

There is a consensus among researchers that the contract is an essential part of outsourcing (Ulset, 1996; Weeks & Feeny, 2008; Oshri et al., 2015). According to Weele (2010), it is important to keep in mind that a contract should reflect the interests of both parties and as such be negotiated in cooperation to maximize potential reward.

There are three prevalent contracts for outsourcing according to Yao, Jiang, Young and Talluri (2010). These are fixed price, cost plus and gain sharing. A *fixed price* outsourcing contract includes all costs for an agreed project. *Cost plus* contracts include agreements and fines for contract breaches. This type of contract includes many details and requirements and is often hard to clarify to a full extent. Finally, in *gain sharing* contracts the buyer and supplier share any burdens of cost overruns or the benefits of savings.

Weele (2010) discusses eight types of contracts. Presented here are the contracts which are most relevant to the thesis and under which circumstance they may be used.

- Lump sum fixed price - *The supplier agrees to complete the work against a fixed price based upon a predefined, detailed scope of work. Everything that is not included in the scope of work is settled between parties on an ad-hoc basis.*
- Reimbursable turnkey - *In this situation the provider is compensated for all costs that he incurs for executing the project or a certain activity.*
- Cost reimbursable - *The supplier agrees to complete work on an open book, open cost basis, based upon a general scope of work. There is no sharing of savings.*

Jones (2004) argues that when agreements are made, each party presumes that the other will behave truthfully and fulfil its part of the agreement. But because of imperfect markets with information asymmetry and bounded rationality each party to an agreement cannot fully observe the behaviour of the other. This increases the risk of opportunism which the author defines as *"a lack of candour or honesty in agreements or transactions: in short, self-interested behaviour to deny the other party of the agreed benefits" (ibid. p. 290-291).* If purchases are infrequent, if there are few suppliers or if changing supplier is difficult, then the risk for opportunism may be higher (ibid.). Eriksson-Zetterquist, Kalling and Styhre (2015) distinguish between two types of opportunistic behaviour; ex ante and ex post opportunism. Ex ante describes opportunism prior to an agreement and is a result of asymmetric information where a buyer and seller have different information. Ex post opportunism

concerns whether or not the trading parties stick to a made agreement. McIvor (2009) means that a supplier's opportunistic behaviour is considered to be a central concern in outsourcing collaborations.

According to Baye and Prince (2014) specialized investments can lead to opportunistic behaviour since a firm may try to exploit the sunk nature of an investment. For instance, a supplier can agree to manufacture a nonstandard component for a buying firm which is then to be used for assembling a final product. Once the relationship reaches a point where the buyer becomes dependent on the supplier, the supplier might try to increase the price since the buying firm cannot buy the component from anyone else or easily switch supplier. This is what is referred to as the "hold-up problem". This kind of opportunism would make firms unwilling to engage in relationship-specific investments unless contracts are structured in a way to reduce the hold-up problem (ibid.).

3.3 Operational Phase

The operational phase is the stage when a supplier has been chosen, contracts are signed and a product or service is in the making. Typical for this phase is uncertainty and change.

3.3.1 Cost management

When it comes to cost disclosure practices there are a number of established terms and definitions (see, e.g., Mouritsen et al., 2001; Kulmala et al., 2002; Lamming et al., 2005; Agndal & Nilsson, 2008; McIvor, 2001). Even if the terms and definitions of cost disclosure practices may differ they have one thing in common; they describe the exchange of cost information in a buyer-supplier relationship (Romano & Formentini, 2012). In this thesis, the term open book accounting (OBA) is being used for cost disclosure, meaning, making a supplier's cost structure transparent.

OBA is key tool when it comes to IOCM according to extant research (Cooper & Slagmulder, 1999; Mouritsen et al., 2001; Kajüter & Kulmala, 2005; Agndal & Nilsson, 2009). The purpose of IOCM is to find methods for buyers and suppliers to coordinate activities so that joint costs can be minimized. The objective is to find lower cost solutions than would be possible if each counterpart were to independently attempt to reduce costs (Cooper & Slagmulder, 1998). The main idea behind OBA is to nurture buyer-supplier collaborations

where both parties actively work towards minimizing waste and capturing joint value (Agndal & Nilsson, 2008).

According to Romano and Formentini (2012) OBA is not regarded as a method mainly to reduce costs, but rather to develop beneficial relations between buying and supplying firms. This is in line with Kulmala (2004) as well as Agndal and Nilsson (2008) who argue that cost disclosure can generate higher levels of trust, collaboration and dedication between buying and supplying firms. The disclosure of cost data, and hence the increase of trust, may for example help to avoid tensions during pricing negotiations and reduce cost information asymmetries (Romano & Formentini, 2012).

However, there are indeed several potential pitfalls when implementing or utilizing OBA. Windolph & Moeller (2011; 2012) for example argue that open books often lead to relational distress due to an increasing risk of buyer opportunism. According to Kajüter and Kulmala (2005) some of the main causes for implementation failure of OBA are: (1) Suppliers feel that OBA does not generate equal benefits; (2) Suppliers feel protective about accounting information and think that such data should be kept within the firm; (3) Suppliers are unable to produce accurate cost data and see no sense in sharing data that might be misleading; (4) Suppliers are afraid of being exploited if they reveal their cost structure.

When it comes to supplier development (SD), Lawson et al. (2015) argue that SD often plays a key part in the operational phase of outsourcing. Investing in SD during NPD gives the buying firm the ability to tailor the supplier to its own needs and build relationships which may create relation-specific assets such as knowledge sharing. According to Dyer and Singh (1998) SD during NPD can initiate innovativeness and boost performance which in turn may result in a competitive advantage. Lawson et al. (2015) point out that although most research proclaims SD as beneficial, the assumption has been disputed when it comes to practice. The authors imply that a possible reason for this is that little research has explored how buying firms assign resources to SD efforts before and during NPD.

4 Results and Analysis

The chapter is divided into three main parts (strategic, transitional and operational phase) with separate subsections. In each sub-section, we present the empirical evidence from the two studied companies. We then analyse each subsection by comparing the empirical evidence and relating this to the theoretical framework.

4.1 Strategic Phase

4.1.1 Why should a firm outsource?

GKN Aerospace

(4.1.1 Why should a firm outsource?)

At GKN Aerospace, there is usually an uneven stream of R&D projects. These projects are often part of bigger projects initiated by other OEM contractors or organizations such as the EU. Once a project is taken on by GKN the time schedule is very tight. Thus, the uneven stream of projects in combination with tight deadlines makes it challenging for the company to plan for future availability of internal recourses. Common such resources are manufacturing machines and NC-programmers (an individual who is responsible for programming automation of machine tools). A Procurement Manager stated that *"When you start a project there may in fact be programming resources available internally. However, six months in advance, or three months in advance, we do not know. It is almost impossible to get that answer [from resource owners]. When it comes down to it, it may be possible to shake loose resources, it depends on priorities from week to week. A project cannot live with that kind of uncertainty"*. The uncertainty of resource availability is therefore a major reason to why GKN outsource manufacturing activities in R&D projects. Early on in the project cycle a decision is made whether to manufacture at GKN Trollhättan or at another GKN site. Due to the fact that many manufactured goods in R&D projects are unique and not solely designed for mass production, it is often the case that a project may impede rather than increase efficiency.

A further reason for outsourcing activities regarding R&D is when GKN do in fact lack knowledge. If a new material is tested for instance, then outsourcing may help to learn about associated risks and possibilities from a supplier with greater knowledge. A Procurement

Manager stated that *"You can learn a lot from a procurement process itself, even if no deal is reached. It is sometimes strategic to bargain in order to learn, with the intention to manufacture the good ourselves in the end".*

Volvo Cars

(4.1.1 Why should a firm outsource?)

Due to fast growth in recent years, Volvo lacks some key competencies required to keep up with research and development. Although the company has the financial resources at hand, they do not wish to hire more employees at this time. The main reasons mentioned are lack of space and incurred organisational costs. Outsourcing therefore seems as a rational choice. A Senior Purchasing Manager states that *"There are two main reasons why we outsource, either we lack the resources or we lack the competence"*.

Today the most common type of outsourcing engagement regarding R&D is with system suppliers, the sort of firms that provide products in large quantities to Volvo's and other car manufacturer's assembly lines. Typical for the relationship between Volvo and such suppliers is that the suppliers do research and development themselves, but having Volvo involved as a partner. Here the suppliers see their R&D as an investment or the building of a platform for future business between the two parties. Therefore, Volvo benefits from not having to carry the costs associated with the research and development.

Another important part of outsourcing to system suppliers is the valuable information Volvo attains regarding the automotive market in general. A Senior R&D Manager exemplifies *"Because they [system suppliers] are active across many car manufacturers they serve as consultants for in what direction the wind is blowing. What development trends can be seen? Should the gearbox have 6, 7, 8 or even 9 gears?".* Outsourcing to system suppliers is therefore in a sense a type of continuous market survey.

Although system suppliers may deliver high quality and provide cost effective products, in many cases they do not deliver optimal solutions. The reason for this is that such suppliers have to think of its synergies with other customers and their technology available at hand. Volvo are therefore currently surveying opportunities to increase added value by outsourcing full concept solutions to developing suppliers. The main difference between system and developing suppliers is that the latter doesn't mass produce products, but rather prototypes.

Their business model is to emphasize on research and development which is a core competence.

A Senior R&D Manager argues that outsourcing full concept solutions to development suppliers is still in its cradle but will most likely increase in the future. When asked to elaborate on this the Senior R&D Manager stated *"We want to ensure ourselves that we understand why a design has a certain configuration, we want to take part of the calculations, we want them presented to us. We want the knowledge behind the results, not just the results"*. The rationale behind this is that Volvo believe that if they are able to understand and master the specifics of certain solutions of a system, then they will be able to optimise the whole system itself.

Another objective with outsourcing to developing suppliers and obtaining their knowledge, is to possibly be able to vertically integrate these activities in the future. The past few decades of substantial outsourcing have according to a Senior R&D Manager led to losing competencies. Today, due to the short timeframe associated with most R&D projects, Volvo does not have the time to build a sufficient knowledge bank or acquire resources to make an investment in vertical integration viable at this point.

Analysis

(4.1.1 Why should a firm outsource?)

The primary reasons for why GKN and Volvo outsource differ, although there are partial similarities. Generally, Volvo has the need to outsource because they do not have the knowledge required for their R&D projects, while GKN do not have the resources available. According to Wheele (2010) firms often outsource to ease the workload in busy times. This is true for both firms, although for different reasons. In GKN's case fluctuations stem from an uneven stream of R&D projects while workload at Volvo is caused by fast growth.

Oshiri (2015) mentions that attaining supplier knowledge and experience are important incentives to why firms outsource activities. This is particularly true for Volvo and their outsourcing of full concept solutions. The primary purpose is to attain and absorb knowledge from the supplier. We see some evidence supporting Oshiri's (2015) reasoning at GKN but definitely not to the same extent. Instead, GKN's main reason for outsourcing manufacturing activities seems to be comparable to hiring temporary labour in order to not disturb its regular production.

Wagner and Hoegl (2006) argue that manufacturing firms often expect suppliers to take of responsibility product development, integration, performance and so on. Volvo apply this approach to gauge market trends which is very important to the company. System suppliers that are big players on the market usually supply several different car manufacturing firms. By cooperating with such system suppliers, Volvo get a sense for various market trends which is very valuable to the company. Such information can minimize the risk for making investments in the wrong things. We cannot see any type of this kind of intentions from GKN. A reason for this is that the aerospace industry is not as trend driven.

Both firms mention not wanting to bind cash, which is well aligned with Oshiri's (2015) logic. But it seems as if Volvo is in general making more aggressive investments for the future. One reason for this can be that Volvo simply is able to do so due to record breaking sales and growth. Although both companies outsource to invest in their future, Volvo has the funds to do it more aggressively. Although both engage in R&D for long haul strategic reasons, basically for their survival, it seems as if when it comes to outsourcing, GKN's main reason is for short term survival whilst Volvo's intention is a long run perspective, especially when it comes to outsourcing to development suppliers. A simple reason may be that GKN has established core competences and know-how while Volvo feel the need for rebuilding some of theirs.

As already stated there are indeed a number of differences between the firms to why they engage in outsourcing. We have no supporting literature, but another possible reason for the differences may be that the firms operate in two separate industries; automotive and aerospace. The industries may not covary on the overall global market. Another possible reason is that the size of the firms might matter. From what has been gathered through our literature review and conducted interviews we find this to be an interesting point of analysis but have not found any research to support it.

4.1.2 What should a firm outsource?

GKN Aerospace

(4.1.2 What should a firm outsource?)

The decision process regarding whether to manufacture internally or to outsource is based on a "make or buy model". The model aims to calculate total costs incurred for outsourcing

versus total costs incurred for manufacturing internally. Although this is the theoretical aim of the model, it is difficult to assess total costs of products in R&D projects due to uncertainty. A Controller stated "*There is no model for how to compile all transaction costs when it comes to R&D projects. [...] Because they are unique purchases, you do as well as you can to include all costs, but it is difficult"*.

GKN's main role in co-financed R&D projects initiated by the EU is to develop and integrate, for instance, a certain part of an airplane engine. A Procurement Manager states *"We are an integrator, we weld and fit. We do the assembly and buy the needed input parts"*. Although advanced machining is a core activity when it comes to serial production according to the Director of Operations, these activities are for the most part outsourced in R&D projects. When it comes to rough machining GKN are far from being competitive according to the Director of Supply Chain. She states that *"Many forging manufacturers also have old and robust machines with very low hourly rates. For instance, firms in Mexico might have old machines that cost $50 per hour, we don't have that here"*.

In co-financed R&D projects GKN has to hand over the results to the OEM, for instance a physical product, results and research data. When it comes to internally financed R&D projects there are no such demands and the company is able to be more protective regarding its research and development. Thus, the outsourcing of solely internally financed R&D activities is kept to a minimum. GKN is therefore able to keep sensitive information and knowledge within the firm to gain competitive advantages through their research. In some cases, outsourcing is used as a way to gain knowledge about a certain manufacturing or design processes. Examples of such processes are the designing of tubes that go into engine components and additive manufacturing.

Volvo Cars

(4.1.2 What should a firm outsource?)

When developing a new car model (or a yearly update of a previous model) the R&D projects are conducted in different phases. According to a Senior R&D Manager, typical for the early phases is that an R&D department works with various sorts of prototypes. He states *"It can for example be that the first delivered cars in a project are only a few, so a common question is who should make what. Is it a probable system supplier? Or is it too early to involve them? Should we use another firm who's a specialist at milling or 3D-printing? Some things can be done here at Volvo, but often we ask a partner to do it"*.

As a consequence of Volvo's outsourcing strategy during the past decades, the firm has gradually lost competences in certain R&D areas. A Senior R&D Manager stated *"Since twenty or thirty years back we've concentrated on developing cars. Firms that are good at making gearboxes have made gearboxes for us, those who are good at making seats have made seats for us. We have been good at integrating parts into a complete car. But this way of thinking is definitely something that Volvo is questioning today"*. A reason for this is that Volvo is now seeing new opportunities for added value due to recent growth and synergies with their owner Geely. As a result, Volvo is currently outsourcing some bigger R&D projects to developing suppliers. One purpose for outsourcing these projects to developing suppliers, instead of relying on a system supplier's research and development, is to efficiently obtain knowledge in order to be able to optimize various construction solutions. Another purpose is to study the possibilities of internal manufacturing.

Analysis

(4.1.2 What should a firm outsource?)

Advanced machining is considered as one of GKN's core activities. Rough machining, on the other hand, is a disposable activity due to other companies being more competitive. This way of thinking goes well in line with what Arnold (2000) argues. In R&D projects advanced machining is nevertheless outsourced most of the time, which implies somewhat of an inconsistency compared to the literature (Quinn & Hilmer, 1994; Arnold, 2000; Weele 2010). A probable reason for this is that GKN seem to base their decision about what to outsource on transaction costs rather than the core competence approach. For instance, the conducted R&D projects include both uncertainty and transaction specific investments (Ellram & Billington, 2001; Weele, 2010).

Volvo currently outsource a few major development projects in order to acquire knowledge. Once the acquired knowledge is absorbed and integrated into the firm, one could argue that Volvo will have developed new core competences. In line with Arnold (2010) and Weele (2010) Volvo is, due to considerable recent growth and a financially strong owner, expanding its existing core and close-core activities. This is an investment that the company can afford and may generate long-term advantages. For instance, based on Ulset's (1996) reasoning, having greater control over certain R&D activities might lead to optimized solutions. Optimized solutions increase customer value and profit margins. If Volvo were to start

manufacturing some of the components previously manufactured by its system suppliers, such vertical integration could generate benefits including less dependence, lower transaction frequency, customized solutions, less negotiation costs, lower risk for opportunistic behaviour and more. In other words, integrating vertically could mean lower transaction costs (Williamson, 1981; Ulset, 1996; Weele, 2010; Ellram & Billington, 2001; Baye & Prince, 2014).

Both firms take transaction costs into account when deciding on what to outsource. The main difference appears to be that GKN generally take on a project-by-project type of approach, while Volvo seem to have more of a long-run strategy. Although both firms outsource to potentially gain new core or close-core competences, Volvo is doing so more intensively. A possible reason for this is that Volvo currently has comparably larger financial resources. Another possible reason could be that GKN Aerospace have a broad knowledge bank when it comes to R&D and seldom need to outsource in order to gain understanding, thus they focus more on transaction costs.

4.1.3 To whom should a firm outsource?

GKN Aerospace

(4.1.3 To whom should a firm outsource?)

When outsourcing R&D activities to a supplier, technical ability and capacity are key factors for GKN Aerospace. A Procurement Manager argues that geographical closeness to the supplier is of value in R&D projects as the definitions are unstructured and future outcomes are unknown in most cases. The Procurement Manager goes on to state *"We are in a development stage, change the design and take pointers from suppliers. We change definitions and test-drive all the time. It's a difficult iteration if suppliers are far away"*. There is an assumption that cultural differences and language barriers are potential hazards when it comes to outsourcing technologically complex activities. Even if specifications were to be well defined, there is some concern that results could differ substantially from what is expected from a nearby supplier.

All participating interviewees agreed that price and OBA were important factors when choosing a supplier. Price is however not a deciding factor, at least not at an early stage in the evaluation process. While discussing this matter a Procurement Manager he stated *"You don't choose a supplier by price, the cost you incur is the price of the quality you get. It is grounded*

in technical competence and resources. Preferably you have several suppliers to choose from with the qualities you seek, then there is a price negotiation". He goes on to argue that price and OBA become more of a key factor at a later stage of the supplier evaluation process, when the number of potential suppliers are narrowed down to a few.

There is not a clear consensus regarding if a supplier may become a future competitor in the long run if too much knowledge is passed on to them. A Project Cost Manager and Director of Supply Chain did not feel that there was any significant threat as there are many obstacles to become a supplier to an OEM. The Director of Supply Chain stated *"It takes a lot to become a direct supplier [to an OEM]. That they [suppliers] would take business directly from General Electric or Pratt & Whitney in the US? I don't know, I don't see it as a great threat"*. A Procurement Manager however did see some risk in the fact that there may be a chance for supplying firms to grow significantly in size by taking on many R&D projects. According to him, this may lead GKN to think twice about who they choose for a specific project. Technological knowledge and capacity were however still more heavily regarded than this theoretical risk.

Volvo Cars

(4.1.3 To whom should a firm outsource?)

Due to the complexity of R&D projects carried out at Volvo, the choice of whom to employ as a supplier is mainly based on technological competence. This often results in having only a few suppliers which have the required capabilities. A best-case scenario is that Volvo have three or four suppliers to choose from according to a Senior Buyer. As a way to mitigate uncertainty regarding a potential supplier's abilities, Volvo often seek internal references from past projects. If there are no internal references available Volvo often ask the potential supplier for a reference project in order to be able to assess technological ability. A Senior R&D Manager stated *"We do not buy them [suppliers] on a twenty-page offer and a meeting. We want to meet several people from the organisation and see their facilities and equipment. We really want a reference project to see, to really understand who they are"*.

Geographical closeness is regarded as semi-important. The longer a project will run the more important closeness becomes. This is however a criterion which should not be a deciding factor. If there is a need for a supplier to be close but they are far away, they should still be hired. A Senior R&D Manager stated *"It cannot be decided by that [geographical closeness].*

Bring them [suppliers] here in that case. If there is an intense period in the project, let them stay here as a resident". He goes on to state about language *"It cannot be based on language. It is, well... It is possible that I may be biased if a supplier speaks very bad English. This would bias me a lot more than geographical closeness".*

Price and OBA are important factors in the selection process. It is however, as geographical closeness, not a criterion which the decision whom to hire should be based on at an early stage. A Senior Buyer stated *"Time-to-market is extremely important, the relatively small amount that you may save by choosing a supplier who is late-to-market might end up costing you billions"*.

There are times when Volvo engage two system suppliers simultaneously who work on the same product solution. By doing this Volvo is able to evaluate each supplier's solution. The supplier who wins the contract gets to absorb its R&D costs, while the one who loses the contract is compensated by Volvo. *"This is not common procedure, I do however believe that we will work in this manner more frequently in the future.*

Analysis

(4.1.3 To whom should a firm outsource?)

In accordance with Weele (2010) and Axelsson and Wynstra (2002), both GKN and Volvo argue that technological ability, knowledge and capacity are of great importance when it comes to deciding whom to employ as a supplier. Due to the technical complexity in R&D projects, there are often only a few appropriate suppliers to choose from. As a result, price cannot be a deciding factor at an early stage, this is true for both companies. Other than technological knowledge and capacity, time to market is an important factor (Krause et al., 1998), especially at Volvo. For Volvo, a hitch in an R&D project could mean the postponement of a car launch. While it is an important factor at GKN as well, the implications of such a delay do not seem as extreme.

Badir (2015) argues that when dealing with a new supplier in an R&D project there is not always enough time to build up a satisfactory amount of trust. This is true for both studied firms. There is a large emphasis placed on getting to know a supplier before making them a business partner. Meetings in person, visiting a potential supplier's factories and obtaining references from past projects where mentioned by both studied firms as a means to reduce uncertainty of supplier reliance (Kedia & Lahiri, 2007). In the supplier selection process cost transparency (OBA) is a way to cope with uncertainty according to extant literature (Cooper

& Slagmulder, 1999; Romano and Formentini, 2012; Agndal & Nilsson, 2009). GKN as well as Volvo mention OBA to be important for mitigating opportunistic behaviour and building a trusting relationship.

According to some researchers (Kedia & Lahiri, 2007; Rilla & Squicciarini, 2011) an R&D collaboration often requires complete understanding of each party's way of working and thinking. According to GKN and Volvo geographical closeness, cultural differences and language barriers should not be deciding factors when evaluating which supplier to employ. In theory, both firms argue that a supplier who is geographically and culturally distant should be able to satisfy their needs equally to a supplier who is close by. While this is what both firms argue should be true, it is not always the case in practice. Although neither of the studied firms have explicitly mentioned that cultural differences are an important factor when it comes down to the choice of supplier, it has been implied in several of the conducted interviews.

Several researchers have in the past argued that suppliers may become potential threats if there is a large amount of outbound knowledge spill over (Arruñada & Vázquez, 2006; Rossetti & Choi, 2008; Dolugi & Proth, 2013). Neither GKN nor Volvo perceive any great threat in that a supplier may eventually become a competitor.

4.2 Transitional phase

4.2.1 Specifications

GKN Aerospace

(4.2.1 Specifications)

At early stages specifications are often vaguely defined, especially the technical drawings. Because of time constraints a supplier may even need to start manufacturing a component before its final definitions are set. A Procurement Manager stated *"The drawings are not always exhaustive or exact, there are parts which are poorly defined and so on. When we push the start button for a project it may be the case that we only know the type of material and the outer measurements".* As a project evolves the definitions and geometrics of a product become more clear. Specifications are worked on in cooperation with a supplier as a project matures. GKN imply that every detail must be relayed in a very exact manner, since

giving a supplier room to interpret too freely may lead to misinterpretations and consequently sub-optimal output.

According to a Procurement Manager GKN's standardized specifications are used for the most part. Specifications include technical drawings as well as definitions on how a certain work processes should be performed. For instance, if a plate is to be cut with laser, a specification defines the conditions and constraints of a laser cutting activity. He goes on to explain "*Although we generally only use standardized specifications in R&D projects, we can often cut corners since the specifications are originally made for flying products. Some components will only be tested in rigs and not on a flying airplane, therefore we can leave out certain things. We tell the supplier to follow the specifications but with certain exceptions. This is defined in a separate document".*

Volvo Cars

(4.2.1 Specifications)

In general, the specifications given to system suppliers and developing suppliers do not differ very much according to a Senior R&D Manager. He states that *"We try to be as clear as possible. It is very difficult when setting conditions, timeframes and what is expected as an end result. It is easier said than done, things happen along the way"*.

Although working with both types of suppliers involves interorganizational teamwork, there is a difference to how Volvo conducts its own role in the cooperation process. With system suppliers, the role is often more passive. Here Volvo provide the specifications while the supplier provides the solution. When it comes to developing suppliers, Volvo try to be more open minded at first and then gradually become more specific as a project evolves. A Senior R&D Manager states that *"We haven't been willing to go too deep into details since we want to take part of their [developing suppliers'] ideas. But as they gradually present their solution we have pretty specific standpoints on how we want things to be"*.

Due to the nature of R&D projects things happen and plans get modified. Such changes in the operational phase often raise questions about which party should be responsible for the additional costs. To minimize the risk of future disputes, the Senior R&D Manager implies that the purchasing department plays a crucial role in the transitional phase. He states that *"The purchasing department's biggest task is to pressure us [R&D department] to make the*

specifications as exhaustive as possible to minimize the risk [of disputes], so that conditions are as good as possible. It is difficult, very difficult".

Analysis

(4.2.1 Specifications)

Nellore and Söderquist (2000) distinguish between a narrow-based view and a broad-based view when defining specifications. Both studied firms cooperate in some form with their suppliers around specification alterations. Thus, both firms take on a broad-based approach where the process of arriving at the final specifications is perceived as important. This is especially true during the early stages of an outsourcing engagement. In regard to what Nellore and Söderquist (2000) discussed regarding complexity and specifications, the two firms seem to act in line. In Volvo's case though, there seems to be somewhat of a paradox. The Senior R&D Manager stresses the importance of making the specifications as complete as possible when contracting a supplier, but also that they initially try to be as open-minded as possible.

When it comes to why the two studied firms are taking on a broad-based approach, the difference is that GKN has little room to do otherwise since definitions from the original contractor are often scarce. When Volvo take on a broad-based approach, they specifically do so because they want to learn and absorb the supplier's ideas. Although both firms initially start with a broad-based approach, the specifications become gradually more specific.

It could be presumed that the reason why Volvo and GKN have different conditions to voluntarily choose a certain approach is due to the difference between the two firm's position in its respective value chain. Volvo is an OEM and is further up the chain. GKN is further down the chain since their R&D projects are often part of a bigger project initiated by the EU.

4.2.2 Contracts and opportunistic behaviour

GKN Aerospace

(4.2.2 Contracts and opportunistic behaviour)

When outsourcing R&D activities GKN use various contract templates such as letter of intent, statement of work and confidentiality agreements. However, due to the vagueness and progressiveness of the R&D projects there is need for flexibility in the type of contracts that GKN draw up with their supplier. According to a Procurement Manager, the purchase order is regarded as the main contract. Specifics are often kept verbal. Sometimes the only fixed point

in a contract at an early stage is a delivery date. GKN acknowledge that there may be some risk involved in keeping an agreement verbal and loose at the edges. A Procurement Manager goes on to explain *"Of course there is a risk, but a verbal agreement is still an agreement. It is as legally binding as a written agreement, although it may be more difficult to prove in times of distress"*.

When it comes to negotiating with suppliers, a Controller argues that GKN has lost some of its purchasing power. He states *"Back in the day when we were owned by the Volvo Group, we had a better point of departure when negotiating with local and semi-local manufacturing suppliers"*. According to a Procurement Manager initial price negotiations are based on a target costing principle. But determining costs is difficult due to the uncertainty of R&D projects. When negotiating with a potential supplier, GKN may have very little information to go on. He states *"We do not demand that our supplier sets a fixed price before they even know what the final product will look like. [...] If the price deviates plus-minus ten or twenty percent it is acceptable".* Due to this, a cost reimbursable approach to contracting is generally what GKN use when outsourcing R&D activities.

When touching upon the subject of opportunism there was a consensus among all interviewees at GKN that OBA is of great importance to mitigate the risk of opportunistic behaviour. If a supplier does not wish to show their internal cost structure it often leads to longer and more costly negotiations. This is in part due to the fact that GKN need to calculate more themselves what should be an appropriate cost allocation to each activity. If the R&D project was of a kind of nature where neither the buying nor supplying firm had any past experience a Controller noted *"When it's new for them and new for us the quality [of the cost calculation] may not be the absolute highest. We will have to add a factor in our calculations for the uncertainty"*. He goes on explaining that it is not always easy to get a supplier to open its books, but it is desirable. He states that *"If the supplier presents its expenses it makes it easier for us to accept that costs turned out the way they did"*.

Volvo Cars

(4.2.2 Contracts and opportunistic behaviour)

When negotiating with a system supplier, Volvo's point of departure is that the supplier's product or solution is not unique. A Senior R&D Manager states *"You [system supplier] will have use of this when working with other customers. This component that you offer us, there*

is a variant of it at Audi and Mercedes. We assume that there won't be large costs involved when it comes to development". This type of negotiation approach is something Volvo exercise increasingly. The system supplier is expected to absorb the R&D costs. He goes on to say *"Few firms back away from us. The difficult part is how to be creative when formulating what you [the supplier] promise, this is where we [Volvo] need to be good at negotiating. It is often here where time becomes an issue and if you have the endurement to be persistent when placing demands. It becomes a game".*

Volvo never use lump-sum turnkey contracts while conducting R&D projects, instead they generally use cost reimbursable contracts. As a consequence, Volvo often require suppliers to be open about their internal cost structure and confer specifics in each category. By breaking down costs by engineers, project managers, laboratory personnel, prototype material and prototype tools, Volvo can monitor the costs and mitigate risks for opportunistic behaviour. While discussing contracts and negotiations a Senior Purchasing Manager stated that *"You try to decide who pays for what and how much is to be paid. It is of course good to have decided upon a price list if you wish to buy extra hours or things of that nature".* He goes on to state *"From the purchasing department's perspective it is always good to settle these things in advance. When the project is up and running there has been a large shift in power from us to the supplier, it is that crass".*

A supplier can be more or less inclined to expose their cost structure. A Senior R&D Manager states *"The balance of power becomes a factor. It's a kind of a game. How far are they willing to go to assert their own position? 'No, we [the supplier] don't want to share this type of information, take it or leave it.' If a supplier holds a very strong position on the market, we might be forced to comply".* He then goes on to explain that this type of supplier behaviour may lead to not working with them again, but that it ultimately comes down to the supplier's position in the market and Volvo's need to acquire their services.

It is standardised that Volvo tries to include as many eventualities as possible in their contracts, such as design changes. This is done by writing additions in the contract itself or by adding appendices. It is crucial to Volvo to include as many variables in these appendices as possible to minimise the risk for extra costs incurred due to changes that are not agreed upon. A Senior R&D Manager stated *"It is extremely important. When you have started a project and something new pops up, you have in most cases already lost all your negotiating power.*

You are then faced with the decision to either swallow the additional costs or to initiate new and costly negotiations".

Analysis

(4.2.2 Contracts and opportunistic behaviour)

Both GKN and Volvo use a contract which can be described as cost reimbursable according to Weele (2010). The main difference between the two firms is that Volvo has a stricter line of approach when it comes to contracting and negotiations. GKN use a 'soft' approach where many details concerning the deal are left in a verbal state. Although GKN see the danger in suppliers engaging opportunistic behaviour in accordance with McIvor (2009) they act in line with Bay and Prince (2014) and do not engage in trying to negotiate a complete contract encompassing as the time constraint is too high.

This way of contracting is opposite to what for instance Oshri et al. (2015) argue is important when engaging in outsourcing. Volvo on the other hand seem to have a process in place where contracts are standardized to the point that they are able to function in a highly complex and evolving R&D environment.

Volvo agree with Ulset (1996), Weeks & Feeny (2008) and Oshri et al., (2015) that the contract is an essential part of the outsourcing process. One reason for this may be the fact that Volvo seem to have a higher purchasing power than GKN and may more readily persuade their suppliers to comply with their demands. There seems to be a connection as well with the fact that Volvo are an OEM, and as such have a higher power over the project as a whole.

None of the firms exhibit any traits of using gain-sharing contracts (Yao et al., 2010) although GKN seem positive to the idea. Again, we draw conclusions from the difference in size being the main factor for the difference here. Volvo do not seem to be as enticed by the gain-sharing type of contact as it seems as their suppliers are more conformed to taking on extra costs incurred than the suppliers of GKN.

There are positives and negatives to each way of contracting. GKN enjoy the flexibility of not being conformed to a rigid, bureaucratic system for contracting suppliers in R&D projects, this is very advantageous as the projects are often very time constrained, again in line with

Bay and Prince (2014). Volvo behave like a large institution where breaches of protocol are not frequent, even if there may be a looser outlook when it comes to R&D it is not at all as flexible as at GKN.

Both firms rely heavily on OBA as a means to reduce the risk of opportunistic behaviour. Although Cullen et al. (2000) and Kedia and Lahiri (2007) argue that a buying firm needs to trust that their supplier will not partake in opportunistic behaviour even if the chance presents itself. There is a concern among both firms that suppliers may not always be truthful. This could be due to the fact that time constraints do not allow for the buying firms to build up sufficient trust, as discussed by Badir (2015). OBA is used as a trust mechanism at a contracting stage where if a supplier is open to disclosing their information, it indicates to the buying firm that they are honest and willing to cooperate. This is broadly discussed in the literature on OBA (Kulmala, 2004; Agndal & Nilsson, 2008; Romano & Formentini, 2012) and seems to fit well in an R&D context. Compared to GKN, Volvo see OBA more as a demand rather than a wish. Again, we argue that this may be due to the fact that Volvo have larger purchasing power.

4.3 Operational Phase

4.3.1 Cost management

GKN Aerospace

(4.3.1 Cost management)

As stated earlier, OBA is used as a tool in other phases during supplier selection as well as during the negotiation process. Since GKN mainly uses cost reimbursable contracts, OBA is used as a tool to monitor and manage costs during the operational phase. If there is a product change request initiated by GKN during the operational phase, there is an underlying perception that the supplier should not be accountable for the increased costs. Examples of additional costs incurred by a supplier may be miscalculations, poor cost data, underestimation of competence or a hold-up problem. When it comes to machining activities, GKN often use their own technical production skills when questioning cost overruns. Since they possess the competence and know approximately how they would carry out a machining activity for instance, GKN's know-how plays a key part when determining if additional costs are reasonable or not.

According to a Controller, GKN use stage gates for partial payments in order to not allow costs to get out of hand. Dividing payments in stages helps overviewing costs in a better manner. However, a procurement Manager argues that if a supplier has accepted OBA and has not shown any tendency of opportunistic behaviour, it might be easier for GKN to absorb some of the unexpected cost overruns.

GKN engage in supplier development to some degree. In general, there is not outspoken wish or plan in place to develop suppliers. However, sometimes when there is need to enhance a supplier's effectiveness, GKN may send its own engineers and technicians as support.

Volvo Cars

(4.3.1 Cost management)

Because of uncertainty and incomplete contracts, a major issue during the operational phase is the determination of which party is to be responsible for additional costs associated with unpredicted changes of an agreement. According to a Senior R&D Manager, OBA is used as a tool for monitoring costs and avoiding hold-up problems. He states that *"The process is definitely designed to ensure that emotions do not get involved, that we base decisions on facts".* The Senior R&D Manager goes on to explain that Volvo has rather extensive demands and expectations on how specific a supplier needs to be when presenting accumulated expenses. *"We ask the supplier to break down expenses to a very specific level. In my projects, we have even questioned things like the seniority of personnel. 'Is it really reasonable that you [supplier] use this many senior constructors this late in the project?'. We [Volvo] want to understand and we are stubborn".*

The Senior R&D Manager argues that sometimes cost overruns are not only a matter of who should pay for what. Holding a small supplier fully accountable may force them into bankruptcy. At this point it becomes a strategic problem. He *explains "The postponing of start of production can't be measured in money. It just can't happen. If there is a risk of the supplier going bankrupt, then we will absorb the overrun costs".*

Since projects usually range over a longer period of time payments to a supplier occur in stages. The supplier needs to fulfil certain criteria in order to receive a partial payment. Such criteria may for instance be a functioning prototype, a test report or a blueprint.

A Senior R&D Manager argues that there is a strong correlation between costs and supplier relationships. He states *"It is obvious that it [good relationship] minimizes waste. If we have a close relationship it will help us, especially at an early stage in a project cycle, to be proactive and tell the supplier when something feels right or wrong"*. All respondents argue that there is often an incentive from suppliers to do well and sometimes absorb costs incurred outside of agreements, such as learning costs so that they may nurture a good relationship with Volvo which may lead to future collaboration.

When it comes to supplier development the respondents imply that it is a naturally occurring phenomena as a relationship matures, but it's nothing that Volvo actively pursuit. A Senior Purchasing Manager states *"I think in these types of relationships we [buyers and suppliers] learn from each other. Especially when it comes to R&D. If a supplier hasn't worked with Volvo before they may not know how we work. Some things we have to teach them so they can understand our process"*.

Analysis

(4.3.1 Cost management)

In accordance with Cooper and Slagmulder (1998), both studied firms claim that OBA is a highly important tool when it comes to monitoring costs. An advantage for GKN though, one might argue, is that they have a better opportunity to do so since many of their outsourced activities are a core competence (Quinn & Hilmer, 1994). However, due to the fact that Volvo use a more rigid system when it comes to contracting it could be argued that the risk may be moderated at an earlier stage. Another way that both firms mitigate the risk of opportunism and the hold-up problem as discussed by Baye and Prince (2014) is to apply stage-gate payments.

The way in which OBA is used by the two studied firms in the operational phase does not seem to be as idealistic as in theory. Although some researchers (Kulmala, 2004; Agndal & Nilsson, 2008; Romano & Formentini, 2012) argue that OBA is used as a way for firms to collaborate and gain trust, we do not find this to be the reason in practice. There could be

benefits for both the buyer and supplier through OBA. However, the way in which OBA is used as a monitoring mechanism seems to cause benefits to be unilateral. The buying firms mainly use OBA as a way to keep costs under control. It seems as though the view of Kajüter and Kulmala (2005) and Windolph and Moeller (2011; 2012) is prevalent in the case of GKN and Volvo when it comes to cost management. Although we do not find opportunistic behaviour in any of the firms, there are indications that OBA is mainly a tool for their own gains. We argue that a possible reason for this is that the nature of R&D projects. These types of projects may not allow for OBA to be used as a collaborative, value creating mechanism as may be case in projects with less uncertainty and longer timeframes.

When cost overruns occur, there is some indication that a relationship may go from formal to informal. More specifically, GKN and Volvo seem to move away from the contractual obligations which may be invoked. Even though it may be the supplier's obligation to absorb the costs, there could be incentives for the studied firms to take them on. One reason for this may be that a supplier could go bankrupt and not be able to supply a product on time, which could lead to devastating consequences. Another possible scenario, as discussed by Baye and Prince (2014), is the hold-up problem. If a supplier holds a product "hostage" and raises the price for some reason, both GKN and Volvo admit that they may need to absorb the costs in order not to jeopardize the project as a whole. However, they mention that when business is concluded with this supplier there will be difficulty in engaging in business again.

Researchers (Dyer & Singh, 1998; Lawson et al., 2015) discuss supplier development and its potential benefits for value creation. Neither GKN nor Volvo actively engage in SD. In contrary to Dyer & Singh (1998) and Lawson et al. (2015), SD is used by the firms as a way of gaining efficiency and lowering costs rather than developing a supplier for future collaboration. The reason for this is probably that most R&D-projects are temporary and limited in time.

5 Conclusions

In this chapter the major findings are summarized and presented as well as the thesis' contribution to previous literature. Finally, areas of study for further research on the subject are also suggested.

5.1 Findings

After studying GKN's and Volvo's outsourcing processes regarding R&D, we can conclude that the two firms' way of operating exhibit some major differences, the main difference being flexibility. GKN's outsourcing methods are agile and of an ad hoc character. The reason for this is twofold. First, there is an uneven stream of R&D projects. Second, since GKN are not the initiators of co-financed R&D-projects, they rarely have access to complete information and their ability to properly manage these projects is therefore limited, at least at an early stage. Volvo's outsourcing methods are rigid and institutionalized. The company is ambitious when it comes to formality and precision. Although these attributes may appear as desirable we find no evidence that this is true in an R&D context, especially when outsourcing to developing suppliers where the collaboration is of a temporary nature. We argue that the differences in the way the firms conduct their outsourcing stem from the fact that Volvo is an OEM, whereas GKN is a first-tier supplier.

Furthermore, we find that the difference in flexibility is a result of operating in separate industries, firm size and organizational structures. In a sense, it appears as if GKN are somewhat involuntarily forced into being flexible but strive toward more control of their outsourcing processes. Volvo, on the other hand, derive from rigid and institutionalized outsourcing processes but appear to recognize a certain need to adapt to a more agile way of managing change. We argue that both firms would probably benefit from finding balance between these two types of outsourcing methods.

The main contribution of this thesis to previous literature is threefold. First, our research describes the outsourcing process in an R&D context from a holistic point of view. We argue that this is of importance since future researchers can benefit from grasping the bigger picture before conducting other in-depth studies. Second, we can distinguish a number of key elements which are apparent and interrelated throughout the whole outsourcing process. These are OBA, uncertainty, trust and fear of opportunism. Third, based on our case study we

find that some outsourcing literature, for instance SD, seems to be less relevant in an R&D context.

5.2 Further Research

This thesis has left out elements of the outsourcing process which may be of importance. Future research would benefit from including these aspects, such as risk management. Furthermore, researchers should explore the need of more agile project management methodologies when it comes to outsourcing in an R&D context. It may also be of interest to view a firm's R&D department as a whole and not only a branch within it as this may aid in building a broader view when conducting future case studies. Investigating interaction effects of further relational variables, such as trust and commitment may also be of interest. Finally, delving deeper into the reasons for why certain outsourcing theories may not be applicable in an R&D context would move the field of study forward.

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8 Appendix

Appendix 1

Introductory Interview Guide

Introduction

Could you please tell us about the organization that you are responsible for?
What is your position in this organization?

Strategy

Does the way purchasing is conducted differ between R&D projects and standardized projects?
What is the process that you go through when choosing a supplier for an R&D project?

Interorganizational Cost Management

How do you and the supplier typically cooperate?
Are there any joint actions taken to keep costs down for both parties?

Cost monitoring

How do you monitor costs during the lifetime of a project?
Do you feel that the budget and results often align in R&D projects?
How do you handle deviations from in costs which are not covered by a contract?

Supplier Development

Do you consider Supplier Development to be necessary in R&D projects?

Initial interview guide

Introduction

Could you please tell us about the organization that you are responsible for?
What is your position in this organization?

Strategy

Why does Volvo / GKN conduct R&D projects?
How do you choose which specific project to invest in?
What is the process you go through when deciding upon whether to outsource an activity or not?
Do you see any strategic risks that come with outsourcing R&D projects?
How is the uncertainty regarding R&D projects handled?
Why aren't these types of activities conducted within the firm?
Could you please tell us about the process of choosing a supplier for R&D projects?
How do you secure that decisions in R&D projects are based upon facts and not emotion?
If you look back a few years, do you outsource R&D activities more or less than today?

If you look forward a few years, do you think that you will outsource R&D activities more or less than today?

Interorganizational Cost Management

How do you and the supplier typically cooperate?
Are there any joint actions taken to keep costs down for both parties?
What economic challenges do you find characterize R&D projects?
Is it important to be transparent while negotiating with a supplier?
How much of their cost-structure must a supplier be willing to show in order to be sufficient?

Cost Monitoring

How do you monitor costs during the lifetime of a project?
Do you feel that the budget and results often align in R&D projects?
How do you feel that the quality of a suppliers offer often holds high standards?
How do you handle deviations from in costs which are not covered by a contract?
At what frequency do you monitor costs derived from R&D projects?
How do you handle changes in a project from an economic standpoint?
How does the organization feel about sunk costs or hold ups?
When and how is a supplier payed during an R&D project?

Supplier Development

Do you consider Supplier Development to be necessary in R&D projects?