



UNIVERSITY OF AGDER

Risk and reward Sharing Partnerships

A Study of Cross-Industry Adaptation from the Aviation
Industry to Oil & Offshore.

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I. Preface

This thesis concludes the study in Industrial Economics and Technology Management at the University of Agder, UiA. The study was conducted during the spring semester of 2019 in collaboration with MacGregor AS, and comprise of 30 ECTS.

The idea behind this study was developed by Tor Eide from MacGregor AS to evaluate the opportunity for using risk and reward Sharing Contracts with their own partners. Once I learned about this opportunity, I had few doubts that this was exactly the study I wanted. I have a great interest in the subject of contract management from an earlier course, and this was a fantastic opportunity to learn more about outcome-based contracting, as well as providing me with a chance to contribute with research that might make a difference.

This semester has been fun, interesting and rewarding, but at times also frustrating. However, there is no doubt that this has been an experience I will remember, and it is satisfying to see the results of all the hours of writing, thinking, and debating with both myself and my fellow students. Additionally, this thesis was not the only outcome of this study, as it was also the inspiration for an article submitted to the Engineering Procurement & Project Management (EPPM) 2019 conference. The conference paper was based on an early version of this study regarding the requirements for adopting the RRSP and is included in Appendix D of this paper.

I am very grateful for being given this opportunity, and I would like to extend my gratitude to the following: First I would like to thank Tor Eide, strategic sourcing director at MacGregor AS for giving me this opportunity, and also providing me with the respondents for the interviews. These were vital for the study. I would also like to thank Associate Professor Gøril Hannås, my supervisor for this study, for the continuous feedback and help along the way. Gøril Hannås was also a co-author for the article submitted to EPPM19. Furthermore, I would like to thank Professor Omera Qayyum Khan for help with scoping at the start of the study, and Associate Professor Magnus Mikael Hellström for his contribution to the paper for EPPM19. Finally, I would like to thank everyone who contributed by participating in the interviews for their openness, positivity and generosity. I appreciate you took the time out of your schedule to help me.

Grimstad, 24th May 2019



Theodor Kvæven Halvorsen

II. Summary

After the 2014 drop in oil prices, there was a need for several organizations in the Norwegian oil and offshore sector to optimize their operations. One of these companies, MacGregor AS, wished to innovate their supply chains to face certain challenges. One solution they considered was to adopt a partnership model from the aerospace industry called risk and reward sharing partnerships (RRSP).

Traditional procurement strategies usually involve a buyer and a supplier. The buyer purchases a good or service from the supplier, and further refines the product before selling it to customer. However, in the RRSP contracts the supplier and buyer cooperate in the design, production and life cycle support of a single product. By doing so, the supplier will collaborate with the client by contributing either by funding, expertise or resources that is necessary for the development of the product. In return, the supplier is considered a co-owner of the product, and are entitled to a share of the future revenue.

The intention of this study is to consider whether the RRSP is adaptable to other industries through the problem statement:

“How may risk and reward sharing partnership contracts be adapted to other industries?”

It was uncovered two research gaps in this study. The first considered the antecedents for using RRSP, i.e. contextual prerequisites. The second research gap concerned the lack of a supplier perspective on the RRSP constellations. Both are considered important when discussing whether the RRSP would be a good fit for other industries, as well as when considering any necessary adjustments.

To answer this question, an abductive, qualitative case study was initiated with two supplier organizations from the aerospace industry, as well as a market study. MacGregor AS was also used as a case study to evaluate the transferability of the RRSP.

The study will consist of three research questions that aim at identifying the output from the RRSP, which is the benefits and disadvantages of the partnership model. Next step is to identify the input factors for these outputs, which will be the prerequisites of the RRSP constellations.

The final step is to evaluate the transferability of these prerequisites using MacGregor as a case study.

The result was a model that describes the absolute requirements for using the RRSP, before identifying the different outcomes the RRSP is associated with. Once the output is defined, the model links up the output with the contextual explanations that has resulted in this benefit, in order to evaluate how this compares to the new situation.

The results were that it is reasonable to believe that the RRSP is transferable to other industries. This is because the RRSP is already used on a quite diverse portfolio of products and components with several different business models, meaning it is no reason to believe it is not applicable in other contexts. The only limiting factor that has been identified has to do with the excessive regulations and competitive situation in the industry, as there has been identified what appears to be a significant buyer-power due to the suppliers' dependency on a few buyers, which is why the supplier benefits are usually associated with long-term opportunities.

It is hence expected that MacGregor, with some minor alterations can use the RRSP with its suppliers to solve several of the challenges they face. However, it is argued that a supplier-focus is not necessarily the most favorable option due to MacGregor's strategic intention to use the RRSP as a tool to solve agency problems, which is not what the RRSP is intended to be used as. By adopting the RRSP with MacGregor's customers, it is very likely that they will solve their challenges, as well as the supplier-benefits of the RRSP which is associated with higher profit margins and predictability in cash flows.

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1 Introduction

1.1 Background

The level of investments and general economic activity in the Norwegian offshore sector has since the 2014 drop in oil prices been decreasing, and forecasting are not suggesting any increase soon (Hovland, 2019). For the sector to stimulate investments and innovation, as well as to improve internal processes, there is a need for change. The sector therefore looks to the aerospace industry for inspiration, as parties in this industry have with success implemented what is known as risk and reward sharing partnerships (RRSP aka risk sharing partnerships) (Figueiredo, Silveira, & Sbragia, 2008). The aerospace industry has since the 1990s used RRSP contracts to handle certain challenges faced in the development of new aircrafts. The fundamental concept of the RRSP is that the original equipment manufacturer (OEM)/ aircraft producer outsources a complete sub-assembly to a partner. The partner will be responsible for both design, production and service costs, and will in return be rewarded with a percentage share of all the future revenue of the planes, corresponding to the value of the sub-assembly (Figueiredo et al., 2008).

The apparent success of this partnership-model in the aerospace industry has caused organizations in other industries to consider whether the RRSP could be a viable option in their industries. However, a literature review shows limited research on the RRSP across other industries with similar conditional contexts. In addition, most studies on RRSP seem to adopt a buyer perspective, whereas the suppliers' perspective has not yet received much attention. Both are regarded important if cross-industry learning is to be promoted.

This study therefore aims at investigating the pre-existing factors that enables the use of RRSP, including a supplier perspective, to enhance knowledge and understanding of why RRSP may be a viable option within a specific industry environment, and under which circumstances these benefits may apply when the product environment is changed. The study elaborates extant theory with insight received from interviews with two suppliers in the airplane industry. A framework is presented describing contextual factors favoring a possible use of RRSP as a contractual model.

1.2 Research Questions

The idea for this study was initially developed by individuals at MacGregor AS, a major organization in the oil and offshore sector, due to challenges faced in their existing partnerships. The aim was to initiate a study to investigate whether the RRSP, predominantly used in the aerospace industry, could be tailored to the oil and offshore sector. The essence of the overarching problem was therefore:

“How may risk and reward sharing partnership contracts be adapted to other industries?”

When conducting a preliminary literature review, it was discovered that there was conducted several case studies on the RRSP, however, none discussed why the RRSP is working the way it is. In addition, none of the RRSP case studies covered the supplier-perspective of the agreement.

For this study to investigate how, and if, the RRSP can be adapted to other industries, it is necessary to build an understanding of both why a company in the aerospace industry would choose to adopt this form of contracting, and then what prerequisites are necessary for the RRSP to be favorable. This is done by identifying an output of the RRSP, which is why the companies are using the RRSP, and then identifying the necessary input factors (prerequisites). Once the output and input dimensions are identified, it is possible to discuss whether these input factors are transferable to other industries, and then what output is realistically realized. The following Figure 1 illustrates how the research questions have been developed to investigate the phenomena.

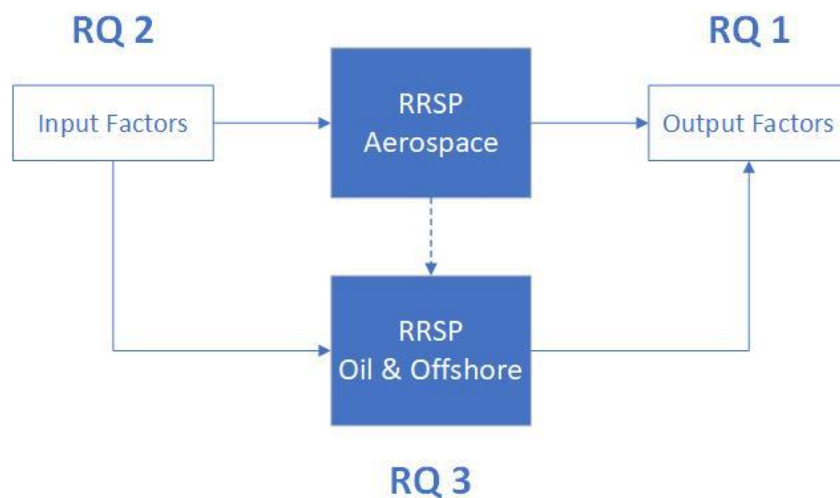


Figure 1 Creation of research questions in this study

The first step of this study is hence to identify the output dimension of the model. This is believed to be the benefits and disadvantages of the RRSP, as the reason for adopting a partnership is to achieve a set of benefits. These benefits will also come at the cost of certain disadvantages, meaning it is necessary to identify the expected trade-off as well.

The need for such a research question arises from a gap in the existing literature on RRSP. Apart from the prerequisites, there was uncovered a missing focus on the supplier perspective of the RRSP in earlier research, and why the supplier organizations would find the RRSP favorable. Since a partnership consists of more than just the buyer, it is vital to also understand why the suppliers would want to join in on an RRSP product when assessing transferability. The first research question is therefore:

RQ1: “What are the benefits and disadvantages of RRSP from both the buyer and supplier perspectives?”

Once the study has uncovered the reasons for using the RRSP, it can focus on uncovering the contextual factors leading to the output. This is interesting because there has been conducted limited research on the antecedents and prerequisites of the RRSPs from the aerospace industry in the past. The second research question was formulated as the following:

RQ2: “What are the prerequisites of entering an RRSP?”

By identifying the factors that are leading to the realization of certain benefits and disadvantages, one can discuss whether it is reasonable to expect that the output of the RRSP is transferable to other industries. The discussion will have to consider to what degree the RRSP can be directly transferred from the aerospace industry, or if adjustments are needed for cross-industry adaptation. This results in the final research question:

RQ3: “Is the RRSP transferable to other industries?”

1.3 Limitations and Assumptions

To ideally investigate the RRSP and its prerequisites, one should investigate as many RRSP constellations as possible, however, this study will be limited by the availability of respondents. The study included two supplier companies with significant experience in RRSP, which was

enough to develop a model explaining the prerequisites from two independent constellations, however, future research should aim at verifying the model by ensuring that the description is fitting to other scenarios as well. The study will also be limited to investigating the RRSP as they are in the aerospace industry.

The study will assume that if an organization choose to adopt a new partnership model, it is because they want to realize a set of benefits. However, by adopting a partnership, certain disadvantages will follow. It is hence assumed that the output can be explained using certain preexisting conditional factors. This assumption is based on the origin of the study, as the aim is to evaluate whether a certain set of benefits is transferable to a sufficient extent to solve specific issues. Therefore, the benefits and disadvantages will be regarded as the output of the partnership model.

2 Theory

To both understand the RRSP, as well as begin to identify the different factors resulting in the output of the partnership model, it is necessary to review the existing RRSP literature. This chapter intends to first provide a literature review of the risk and reward Sharing Partnerships and other relevant aspects of its use. Once literature review of the RRSP is concluded, a summary of transaction cost and agency theory will be presented, before a preliminary, theoretical model for the RRSP is presented. The articles of the literature review are summarized in appendix A.

2.1 Risk and Reward Sharing Partnerships

The risk and reward sharing partnerships (RRSP) as a contractual model originates in the aerospace industry (Figueiredo et al., 2008). It was adopted by some manufacturers in the mid-1990s as a response to challenges both in the market and supply chains. Figueiredo (2008) explains that the RRSP was inspired by strategic partnerships in general and developed to reduce the need for investments and the dependence on loans for product development from the buyer side followed by these investments. To reduce this need for investments, the aircraft manufacturers decided to let certain suppliers contribute with funding, with the promise of a future revenue share from the product series in question. The result was a reduced commercial risk, as the suppliers paid to be part of the development to ensure long term profits. In addition to the need for capital, the partnership model was adopted to secure long-term relationships between international suppliers and the OEMs (Armellini, Kaminski, & Beaudry, 2014; Buzacott & Peng, 2012).

The suppliers in these partnerships will provide expertise, resources and funding, and is chosen based on the buyer's needs. It is important to note that even though companies are sharing risks and developing technologies together, does not necessarily mean the collaboration is an RRSP. This is because the main criteria for an RRSP is that there is a participative sharing of risks, and that the parties involved have rights to future sales income from the products (Figueiredo, 2008).

The two major control mechanisms in RRSP are risk and reward sharing (Tse, Zhang, & Jia, 2018). The risk sharing mechanism focuses on aligning the responsibilities of the different partners. This means that the parties are responsible for a certain level of risk and participate in mitigation of risk, rather than the client being the sole risk taker in the contract. The reward sharing on the other hand is a behavioral mechanism aligning the goals of the involved parties. The duration of the

reward-sharing may differ from contract to contract. In the RRSP, the partners are included on a product-basis, meaning the partners will receive a part of the revenue for each additional unit sold of the product throughout the product lifetime, and not just the revenue from the initial sales (Figueiredo et al., 2008). By sharing the future profits of the product, it is expected that the suppliers will act in favor of the project, and not just themselves. These aspects result in the previously mentioned definition of RRSPs, which is that there is a participative sharing of risks, and that the parties involved have the rights to share future sales income from the products.

An RRSP contract is different from traditional collaborative contracts where the supplier delivers a product or service for an initial price that covers their costs and profit margin. In this setting the client's further refinement of the product allows for a higher price to their customer, which accommodates the cost of goods sold from the supplier, cost of further value-added processes of the product, as well as a profit margin for the client. This scenario is illustrated in Figure 2.

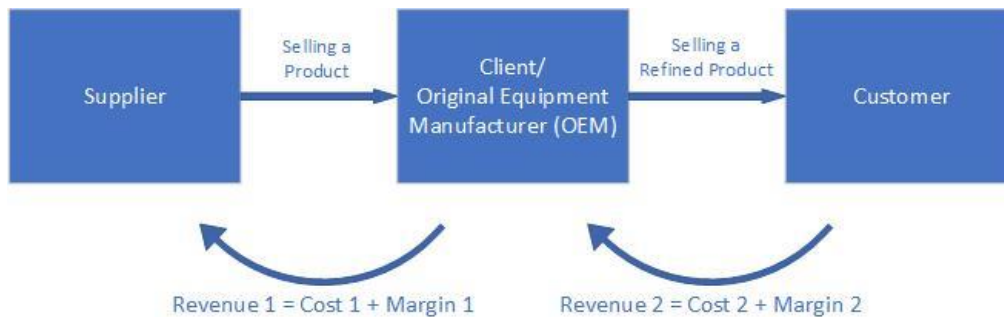


Figure 2 Traditional supply chain collaboration

However, in the RRSP contract the supplier and client cooperate in the design, production and life cycle support of a single product (Wagner & Baur, 2015). By doing so, the supplier will collaborate with the client by contributing either by funding, expertise or resources that is necessary for the development of the product. In return, the supplier is considered a co-owner of the product, and are entitled to a share of the future revenue.

The characteristics of an RRSP arrangement is that it is done through an incentivized contractual model rather than investments in a joint venture arrangement. In the aerospace industry, this has been done by splitting the plane assembly into several smaller sub-assemblies. Each partner will be responsible for their own assembly and receiving a revenue share based on their initial sub-assembly risk. Initiating RRSPs is done on a plane to plane basis, meaning that for every new

airplane in a product-series sold, the risk and reward sharing partners will receive an additional compensation for the initial risk undertaken (Buzacott & Peng, 2012). This is illustrated in the following Figure 3.

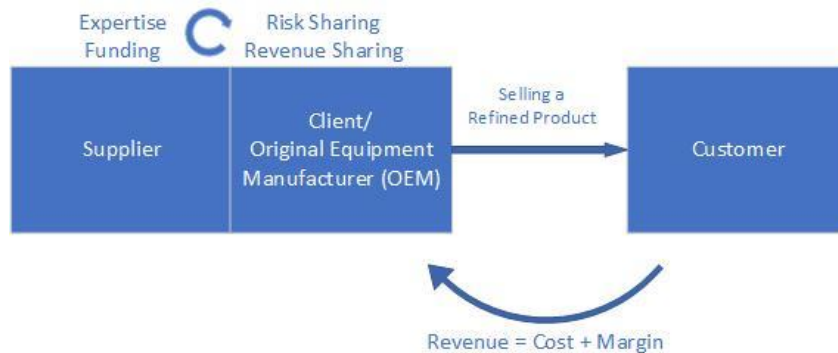


Figure 3 Collaboration in risk and reward sharing partnerships

Through the literature review, two main gaps in knowledge of RRSP emerged. The first is lack of knowledge concerning the antecedents and prerequisites of RRSP, i.e. are there specific circumstances that contribute to make RRSP a viable option in the aerospace industry? The second gap concerns the lack of studies on how RRSP is perceived by the supplier side of the collaboration. Both knowledge gaps are of interest when investigating the rigor of the model and adaptation possibilities to other industries. Limited understanding of why it works in one industry poses the risk of adopting the model to a new business context by “shooting in the dark”. This study, therefore, aims to uncover specific institutional factors from both the perspective of the buyer and supplier that are prevalent in RRSP relationships and their business context. A first step is hence to study the characteristics of the markets where it is currently used.

2.1.1 Characteristics of Aerospace Equipment Industry

In order to understand the contingency factors of the RRSP, it is necessary to understand the market context in which the partnership model originated. The focus of this chapter will mainly be on the aviation sector of the aerospace industry, and the production of airplanes, which is where the RRSP is predominantly used. It is estimated that the production of airplanes account for close to 80 % of the total revenue in the aerospace industry (Goehlich, 2008). This number rises to 90 % when including the production of the weapons systems for military purposes. It is estimated that military contracts accounts for nearly 50 % of the revenue from airplanes. According to Goehlich (2008), the forecasting of demand for airplanes in 2008 was expected to increase drastically over the next

decades. Already in 2008, demand was estimated to be 1000 airplanes per year, which by then was above the current production capabilities.

The market structure is an oligopoly, with 6 major manufacturers in the aerospace industry (Jordan & Lowe, 2004). Out of these 6, Boeing and Airbus are the clearly dominant producers (Goehlich, 2008). According to Jordan & Lowe (2004) no companies have all the necessary specialists to develop and produce airplanes on its own. Moreover, the suppliers often have a diversified portfolio and deliver solutions to other industries. This often makes the manufacturers more dependent on the suppliers, than the suppliers are on the manufacturers (Goehlich, 2008).

Due to the military contracts, as well as the excessive requirements that focus heavily on safety, there is very limited number of suppliers that can contribute to the production of airplanes (Jordan & Lowe, 2004). As a result, the different suppliers are often working as partners and competitors at the same time on different projects. This situation results in a situation that nurtures little trust and communication, as the suppliers' main reason for gaining competitive advantage relies upon the specific knowledge they possess.

The political factor, where governments require manufacturers to include national suppliers on the product results in large, complex supply chains, with several partners on an international scene. The partnerships in the aerospace industry has become known as “shotgun weddings”, where the choice of supplier is determined by governmental pressure and lack of competition, rather than being initiated at their own choosing (Jordan & Lowe, 2004).

The products are also highly complex and expensive. According to Nyström (2005), there are several similarities between the aerospace and automobile industry, which both are make-to-order (MTO) industries. An MTO-industry is where a product portfolio is developed, and each individual sale is later tailored to the customer's need. This means that the production of the airplane does not start until after the order is placed by a customer, and the industry is therefore very focused on reducing the lead time of production.

However, unlike the automobile industry, there is a significantly greater extent of complexity (Goehlich, 2008). Whereas a car usually contains 7000 components, the airplanes contains up to 6 million. When also considering that the operating conditions for the products are tougher, it means that even a moderate development in technology for the aerospace industry requires large

investments (Esposito, 2004). This has resulted in high fixed costs of the airplanes (R&D), which leads to lower profit margins and very long payback periods for the products (Goehlich, 2008). It also results in a very high financial risk for the individual manufacturer. The costs are further increased due to high bureaucracy levels, numerous design changes, extended schedules due to delays, and poor, belated communication between the partners (Goehlich, 2008).

As a result, the industry has become known for excessive outsourcing of large sub-assemblies. This results in reduced lead time in the production of airplanes, as there are several suppliers delivering complete sections of the airplanes directly to the assembly manufacturer. The use of larger sub-assemblies, where the different responsible suppliers coordinates sub-contractors results in a reduced need for inventory management and interdependencies of the other sub-assemblies of the airplanes. This would have not been the case with smaller sub-assemblies, as this would have required a more thorough scheduling to avoid further delays (Goehlich, 2008).

However, this complexity and modulation results in a higher performance ambiguity, as it is difficult to assess performance beyond commercial success. Commercial success is also difficult to measure, as the manufacturers normally have only one or two extremely successful products that secures portfolio profits. Most of the production lines are not financially profitable; however, they are necessary to ensure further competitiveness. This is because the airlines prefer to invest in a product family, rather than buying airplanes from different manufacturers (Goehlich, 2008), presumably from an operations and maintenance cost perspective.

2.1.2 RRSP as a Contract and Business Model

The most common examples of how the RRSP has been implemented are drawn from Boeing and Embraer. Both companies have adopted this form of partnering by creating a ranked network of suppliers. Initially, they divide the aircraft into several sub-assemblies, and gives each risk and reward sharing partner the responsibility of a certain assembly. Each of the sub-assembly owners can be considered a risk and reward partner. The supply chain network was hence divided into 3 tiers, which could be described the following way (Denning, 2013; Figueiredo et al., 2008).

- The first tier included the risk and reward partners. These companies were included in the funding and development of the new aircrafts, and hence included in the future reward sharing. They are responsible for different sub-assemblies of the aircrafts and oversee coordinating deliveries from the different tier 2 and 3 suppliers.
- The second tier consisted of parties supplying components, systems or services, but not being a part of the R&D team. These companies were presented with a set of technical specifications and asked to develop a solution for the different sub-assemblies. The tier 2 suppliers report directly to the tier 1 partners.
- The third tier consisted of suppliers providing less complex and less expensive components. These were not presented with specifications, but rather with materials and blueprints. This tier supplied manpower in the production of less critical components. The tier 3 suppliers report directly to the tier 1 partners.

It is worth noting that the tier 1 suppliers are the risk and reward partners, which are responsible for coordinating the tier 2 and 3 suppliers of their own sub-assembly. In some cases, the tier 2 suppliers have been provided with RRSP contracts as well, meaning they own a certain percentage of the sub-assembly, and is rewarded every time that sub-assembly is included in a sold airplane.

The result of implementing RRSPs was positive, when considering the strategic intentions of the two manufacturers (Buzacott & Peng, 2012; Figueiredo et al., 2008). The RRSP did also provide additional benefits beyond the eased access to funding and supplier consolidation. The study on Boeing suggests that the RRSP was shown to accelerate the development process, as a result of earlier involvement of key competencies (Buzacott & Peng, 2012). The RRSP has also been shown to address agency problems, such as opportunism from the suppliers, if implemented correctly (Tse et al., 2018).

Among the financial benefits it has also proved to be favorable in situations with high uncertainty in demand. Buzacott & Peng (2012) explains how the RRSP helped the client by reducing the consequence of low sales figures, as the losses are distributed among the participating parties. It is hence reasonable to believe that the RRSP, through lower financial risk and increased involvement, would be beneficial with regards to innovation and technological development, as Esposito (2004) identified the high R&D costs as a challenge for innovation.

2.1.3 Criticism of the RRSP

There is little criticism of the RRSP within existing literature both as a concept but also from a methodological perspective. So far, most studies on RRSP use case study as a methodology. Hence there are few quantifiable results that have tested the statistical generalization of the findings. Additionally, the RRSP-studies have to a very limited extent covered the perspective of the suppliers, and since there are more RRS partners than OEMs in an RRSP model, existing research findings fail to include most of the involved parties in an RRSP constellation.

However, even though there are limited studies directly criticizing the RRSP, some case studies provide indirect criticism. Examples of these are the studies conducted on the Boeing 787 Dreamliner, which used the RRSP approach (Tang & Zimmerman, 2009). The Dreamliner is an example of product suffering from significant delays and post-launch issues. The case study conducted by Denning (2013) points to several flaws that may arise when using the RRSP.

Denning criticized Boeing for mainly five (5) different aspects of the partnership model, resulting in unnecessary risks. These were the risks associated with outsourcing, innovation, coordination, communication and tiered supply chains. The Dreamliner project outsourced more than twice as much as usual, as well as using unproven technology in an unprecedented scale. When combined with Boeing's hands-off attitude towards coordination, aiming for complete partner autonomy and no on-site support, it was probably not surprising the events unfolded as they did.

From the RRSP perspective one contractual risk on the Dreamliner project was more interesting; namely the risks of tiered outsourcing. This is the business model used by Boeing for RRSPs. The critique was that Boeing used 50 partners, meaning the Dreamliner was split into 50 sub-assemblies, resulting in an insufficient screening. Some of the partners lacked the necessary knowledge regarding both the technical design, but also the experience in supply chain coordination, resulting in delays and technical issues.

The flaws presented in the Dreamliner case appear to be preventable, as several of these risks could be blamed on too ambitious use of the RRSP, combined with poor coordination and monitoring. The case study could hence be considered a recommendation for certain "best practices" in the future. Wagner & Baur (2015) supports this argument by claiming that the challenges with the RRSP so far is mainly due to missing capability or competence of either buyer or supplier.

Another critique of the RRSP model is the lack of incentives provided to the partners for finishing on time. Tang & Zimmerman (2009) discovered that the lack of incentives for meeting deadlines, resulted in massive delays, and millions of dollars of penalties that had to be paid to the customers.

A final interesting limitation discovered in the literature review was made by Tse et al (2018). They discovered that risk and reward sharing both have a positive impact on quality performance, however, when combined they result in a reduction of total quality performance. Tse et al (2018) assumes this is because the reward sharing is intended to motivate further quality performance, whereas the risk sharing aspect presents an acceptable lower limit for quality. The supplier is therefore expected to choose the option with minimum effort, which is stipulated through the risk sharing aspect.

2.2 Strategic Partnerships from a Transaction Cost Point of View

Two theoretical frameworks will be drawn upon to understand the underlying mechanisms of risk and reward sharing partnerships. The first is the transaction cost analysis (TCA). TCA is a study of how organizations economize on transaction costs to govern assets at risk. According to Williamson (1981), a transaction occurs “when a goods or service is transferred across a technologically separable interface”. The transaction costs are hence the costs associated with the transaction of assets. The TCA applies to three different aspects, or levels of analysis. The first concerns the overall structure for organizing economic activities between firms, while the second concerns what activities should be performed internally or be bought from the market. The third is concerned with the organization of human assets (Williamson, 1981).

For this study, the second aspect is the most interesting, as this provides reasons for why an organization would buy an asset from the market or produce it internally within the firm. These are the two extremes in the make- or buy continuum, whereas a hybrid approach will include strategic partnerships/ alliances (Jordan & Lowe, 2004). This is illustrated in Figure 4.



Figure 4 Make vs Buy continuum, based on Jordan & Lowe (2004)

Blomqvist, Kyläheiko, & Virolainen (2002) explains that the original theory on TCA developed by Coase considered the market and vertical integration as the two only options for the firm, before Williamson introduced the concept of hybrid models. These hybrid models are what is considered partnerships, and they are governed by a contract. This is one reason for why a partnership in general is difficult to define, as it covers every single scenario between buying from the “faceless” sellers, where you only interact with the supplier when you buy, and complete equity control (vertical integration).

The human assets in the organizations, will according to TCA, suffer from bounded rationality, meaning they act rationally based on the limited information they possess. This is in contrast to the traditional model, the economic man, where the firms and its employees are considered hyper-rational. This is where the roles of contracts appear, as economic exchange in the case of bounded rationality can be efficiently organized by the contracts. However, due to the presence of bounded rationality, all contracting suffers from degrees of incompleteness (Williamson, 1981).

The contractual assumption of TCA is that complex contracts are expensive to write and enforce. A simple transaction allows for a simple contract, however, as the complexity increases, the parties develop more complex contracts (neoclassical contracts) to safeguard assets at risk from opportunistic behavior (Dyer, 1997). These contracts are often full of contingency clauses, making it more expensive to develop and enforce.

In an earlier study, Williamson (1979) described the three critical dimensions for increased transaction costs. These are:

- Uncertainty
- Frequency with which transactions recur
- Degree of transaction-specific investments required

Based on these variables, a procurement strategy could be developed to minimize the transaction costs. Williamson described that the frequency can be characterized as one-time, occasional and recurrent, and investments are either non-specific, mixed or idiosyncratic (unique). Examples of the different acquisitions are illustrated in Figure 5.

		Investment characteristics		
		Nonspecific	Mixed	Idiosyncratic
Frequency	Occasional	Purchasing Standard Equipment	Purchasing Customized Equipment	Constructing a plant
	Recurrent	Purchasing Standard Material	Purchasing Customized Material	Site-Specific Transfer of Intermediate Product Across Successive Stages

Figure 5 Examples of different transactions (Williamson, 1979)

Williamson propose that the different combinations of frequency and specificity supports different procurement strategies. The non-specific and occasional acquisitions do not support any relational contracting. These would according to Williamson require the use of the market. Non-specific investments can utilize the market’s ability to generate economies of scale, whereas more tailored, occasional investments do not justify the use of relation-specific investments. This means that the hybrid-models, including the strategic partnerships, are supported for products of recurring acquisition and high asset-specificity. The following Figure 6 illustrate when to use the different contracts.

		Investment characteristics		
		Nonspecific	Mixed	Idiosyncratic
Frequency	Occasional	Market Governance (Classical Contracting)	Neoclassical Contracting	
	Recurrent		Relational Contracting	

Figure 6 When to use different types of contracts (Williamson, 1979)

Within the recurrent areas of the figure, it is possible to distinguish between the mixed and idiosyncratic levels of asset-specificity. It is suggested that in the mixed-recurring scenario, the market is still able to generate economies of scale, as they can provide the same product to other clients as well. This favors the use of relational contracting and strategic partnerships. The situation changes however, for idiosyncratic products, because in theory the client should be able to generate the same economies of scale for the product as in the market. The TCA hence suggest a vertical integration, as the product should be possible to produce at the same cost, without the need for relational investments and an additional profit margin required in the market.

2.3 Agency Theory

Even though the formations of strategic partnerships may be described from a transaction cost perspective, another theoretical aspect of contracting may contribute to understand the underpinnings of RRSP. It appears that there are two main reasons for adopting the RRSP. The first has to do with the financial and commercial risk management, which is explained using the TCA. However, the behavioral aspect of RRSP may be explained in the context of principal agent theory (PA).

The agency theory was introduced as a continuation of the literature developed in the 1960s and 70s to describe the risk sharing problems that arises when two or more cooperating partners have different attitudes toward risk. The theory addresses the “agency risks” that appear in a buyer-supplier relationship as a result of differences in both individual goals and division of labor. The relationship will consist of one buyer (principal), and a party that work on behalf of the principal (agent) (Eisenhardt, 1989).

Eisenhardt (1989) claims there are two main agency problems arising in a contractual relationship. The first agency problem arises when the principal and agent either has conflicting interests or goals, or when it is difficult for the principal to verify what the agent is doing (performance ambiguity). The second problem is the problem of risk sharing, which arise when the principal and agent have a different attitude towards risk. This causes the different parties to prefer different actions when faced with a decision.

Both problems are relevant to the RRSP. The first problem, with performance ambiguity, is described in the study of the aerospace industry. It was claimed that product and operating

complexity resulted in high performance ambiguity. The second problem, where there is a difference in attitude towards risk, is related to the statements saying the RRSP is aligning the goals of the buyer and supplier. Since the goals were not aligned to begin with, it infers that there has been a difference in preferred actions.

There are, according to Eisenhardt (1989) three grounding assumptions about the human, organization, and information that the agency theory is based on. These are summarized the following way:

- The human assumption is that it is self-serving, risk averse and, affected by bounded rationality (the individual is limited by the information they possess).
- The organizational assumption is that there are partial goal conflicts between the parties involved. There will also be a certain level of information asymmetry between the principal and the agent.
- The assumption of information is that it is a purchasable commodity. This means that it can be owned, transferred and withheld.

Since the origin, the theory has developed along two major lines. These are the positivist agency theory, and the principal-agent (PA) theory. The positivist tries to identify situations where the principal and agent is likely to have conflicting interests, before describing governance mechanisms to limit the agent's self-serving behavior. The PA theory is on the other hand about identifying and designing the optimal contract for different scenarios, separating mainly between outcome-based and behavior-controlling contracts (Eisenhardt, 1989). A behavior-oriented contract utilizes incentives and contractual mechanisms that are based on how the agent perform, typically through salaries and hierarchical governance. An Outcome-based contract will on the other hand reward the agent, based on how the performance of the end product fares. These contracts often include long-term rewards and stock options.

The outcome and behavior based contracting methods are hypothesized to be ideal in different situations. Eisenhardt (1989) developed a set of 10 propositions to help identify the situations where the two different contracting types are most desirable.

The fundamental assumption is that there are two measures the principal can take to make it more likely that the agent is going to act in the interest of the principal (Eisenhardt, 1989). The first one is the use of outcome-based contracting, while the other is to ensure that the principal have more information than the agent. This is because outcome-based contracting will reward agents based on the outcome-performance instead of how much work they invest. Information will on the other hand help the principal to verify that the agent is working in the interest of the principal.

To summarize the propositions from Eisenhardt (1989), the outcome-based contracts are more favorable in situations with risk-averse agents, high levels of goal conflicts, and high outcome-measurability. Behavior-based will on the contrary be for situations with high outcome-uncertainty, risk-averse principals and low performance-ambiguity. In addition to this, long-term relations with suppliers and investments in information monitoring systems will also favor behavior-based contracting.

The criticism towards Agency Theory is that it operates with overly simplified models, and that several of the conditions that are used to explain the internal processes for the companies are not completely realistic. Baiman (1990) discuss how the agency theory dismiss the circumstances in both the product and capital markets, and how these affect the relationships. This has however, been justified by claiming that the agency theory was not intended to describe the contracts on a micro level, but rather the formula on which the contracts are based on.

Davis, Schoorman, & Donaldson (1997) identifies one of these oversimplified models as the most flawed in the theory, and that is the “model of man” developed to describe the human behavior in the relationship. He criticizes the model by claiming it does not reflect human behavior, to make it possible to conduct mathematical simulations. By claiming all humans are motivated by their self-interests, the theory dismisses the complexity of human interaction and does not suit the demands social existence.

The theory is also criticized over the fact that it does not include the role of trust and fairness to a sufficient extent. When an agent performs an action or decision, it will have an impact on their reputation outside the single contractual relationship. It is therefore expected that agents will act in the principal's interest more often than the PA theory suggests (Baiman, 1990).

2.4 Theoretical Framework for RRSP

This chapter will provide a summary of the theory and identify certain aspects that have been emphasized by the previously conducted case studies and empirical articles. In the introduction, it was described that the model for cross-industry adaptation was expected to have an input- and output-dimension to evaluate the transferability of the RRSP to other industries. The input dimension is the prerequisites/ antecedents of the RRSP, that will be required or increasing the favorability of the partnership models. The output dimension is the expected to be a set of benefits and disadvantages associated with using the RRSP.

It is first necessary to acknowledge that even though the RRSP is presented as a revolutionary contracting method for the aerospace industry in the early 1990s, the concepts of risk and reward sharing predates the RRSP. The grounding theories of transaction cost analysis and agency theory discussed both the formation of partnerships, the issues of risk sharing and outcome-based incentivizing. The RRSP has managed to concretize the risk and reward sharing through the use of sub-assembly ownership, which has been done with apparent success.

Throughout the chapter describing the RRSP through previous case studies, there were some recurring aspects that were emphasized. First, the case studies placed a significant emphasis on certain characteristics of the products governed by the RRSP contracts. The studies described them as very complex and expensive, with high requirements to quality, safety and national security. Due to this complexity, there is a high level of performance ambiguity of the products, apart from the commercial success. The lifecycle of the products includes a design/ engineering phase, and a following MTO (make to order) phase, with high sales volumes. Due to this focus, it is expected that one dimension is affected by the product characteristics in the RRSP constellation.

Secondly, the market situation in the aerospace industry appears to be interesting when considering the prerequisites of the RRSP. The case studies on the RRSP provided three reasons for the companies in aerospace for adopting the partnership model. These were in order to get easier access to funding, reduce commercial risks, and secure long-term relations with key suppliers. This suggests that the market situation is directly linked to at least one of the dimensions of the model. The aerospace industry is an oligopoly with 2 major producers, and 4 smaller, which results in a very limited number of new projects that the supplier organizations can compete for. However, the

producers lack the necessary knowledge on how to design the aircrafts, meaning they rely heavily on supplier assistance in developing the products. The suppliers on the other hand are few and often diversified across several industries, meaning the supplier have a stronger bargaining power in the buyer-supplier relationship. On top of this, it is described that partnerships are built on distrust due to the suppliers' desire to protect their knowledge, which is the basis for their competitive advantage, and because the producers are pressured by individual states to include national suppliers.

Furthermore, since the input-factors are intended to describe why the RRSP is working the way it is, it is deemed necessary to also consider the strategic intention for using RRSP, or more specifically what intentions did the organizations in the aerospace industry have with the partnership model when they first adopted it. Regarding the initial strategic intentions of adopting RRSP, three reasons have been provided in the RRSP literature. These were the desire to get easier access to funding, reduced commercial risks, and to secure long-term relations with key suppliers. Other benefits associated with the RRSP is faster product development, increased goal congruence and a less uncertain future for the supplier due to life-time revenues.

Finally, emphasis has been placed on the business models used by the producers in the aerospace industry, which provides reason to believe that another dimension of the prerequisites would be associated with the business model, and how the parties realize the benefits and disadvantages of the RRSP. Although the definition of an RRSP is that there is an active sharing of risk, with the promise of future revenue, there are certain aspects of the partnerships that appear common in the aerospace partnerships. The foundation of the partnership is built on the idea of risk and reward sharing, and in practice it means that the partners are given the ownership of a sub-assembly. This is done through the tiered system, where tier 1 suppliers are responsible for their own assembly, while coordinating their tier 2 and 3 suppliers.

The partner is hence responsible for covering the development, production and refinement costs of this assembly. In return, the partner will be provided with a percentage ownership of the total assembly, that is decided based on different factors, among the aforementioned costs. This ownership percentage guarantees the partner life-time revenues from the products and provides the supplier with access to the service markets for the products.

These four dimensions results in the following preliminary model, illustrated in Figure 7.

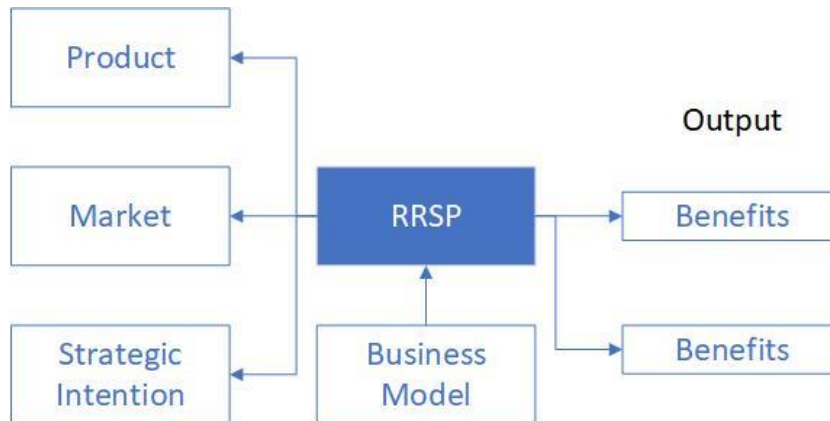


Figure 7 The dimensions retrieved from the literature review

The interviews will be conducted with this model in mind, to test if these dimensions are retrievable from the case study. However, it is important to keep an open mind to ensure that other factors are uncovered and included.

3 Method

In this section, I intend to describe and discuss the methodology used in this study. Jacobsen (2015) explains that for the researcher to generate valid and reliable knowledge about the real world, he or she needs to have a clear strategy. This chapter will therefore describe how research design, case study and the data collection were constructed and conducted to answer the research questions introduced in the introduction.

3.1 Research Design

This study uses a case study of companies using the RRSP to answer the research questions. The case study is suitable for studying research questions regarding “why” and “how” (Yin, 1994). Even though the presented research questions are using the word “what”, the overall theme of the study is to answer a “how”-problem, namely how the RRSP can be adapted to new industries. To answer this, it is necessary to understand why the RRSP is being used (benefits and disadvantages), and why these benefits are achieved (prerequisites). This is one of the arguments for why the case study is used. The case study allows the researcher to investigate many variables across a smaller sample. According to Maxwell (2013), there is no single way to construct a case study, however, it is necessary to continuously assess throughout the study whether the design is working to ensure validity.

Jacobsen (2015) states that the ideal research design is the one that consists of many variables and samples. However, this is difficult to achieve because collection is very time consuming, and rich data requires a lot of processing when analyzing. Most studies will therefore use either few variables and many samples, or few samples and many variables. For explorative studies, such as this, it is hence beneficial with many variables and an in-depth understanding of the phenomena. One could also argue if a single-case study is a suitable choice when intended to generalize findings. However, Yin (1981) explains that the search for an explanation is a pattern-matching process, and even a single-case study needs to match these patterns. This means that for generation of new theory, the single-case is a viable option, however, it will need statistical verification in order to generalize (Jacobsen, 2015).

The next step was to decide whether this study should take an inductive or deductive approach. Since the phenomena that is being studied is a social construct, and not adhering to physical laws,

one could argue that an inductive method is necessary to describe the formation of the RRSP constellations. Because the social construct is by definition changing all the time, and very situational dependent, then the most ideal would according to Jacobsen (2015) be to approach the phenomena with an open mind and not place limitations on the available information. However, since this is an expansion of existing literature, it is also necessary to understand what has already been uncovered. This will result in a data collection influenced by a bias towards the previous research, as well as a need to both address previous research while supplementing with observations to construct new theory.

Hence, by using an abductive approach, the study would be able to rely on empirically gathered evidence from previous case studies, to specify what aspects might be most important to consider, before retrieving data from organizations in the aerospace industry that describe these different dimensions of the RRSP-prerequisites. A risk associated with this study will then be that the literature study conducted in the beginning will result in a too biased interview, preventing collection of proper data.

3.2 Research Process

The research process for this study is illustrated in Figure 8. The figure describes the major stages of the investigation, in order to answer the research questions described in the previous sections.

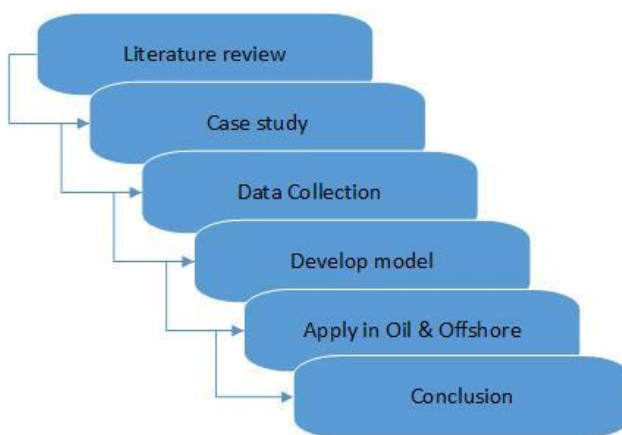


Figure 8 The research process of this study

The study started off with a literature review to both uncover data on benefits, disadvantages, context, experiences with RRSP, and anything that will be of importance to answer the research questions. The literature review will also aid in limiting the search field in the interviews, by

ensuring that the respondents in the case study can help verify findings from the theory. The case study will consist of two supplier organizations from the aerospace industry, which is using the RRSP. Once the literature review and case study are completed, the findings will be triangulated to determine the contingency factors of the RRSP, which will finally be applied to MacGregor AS in the Norwegian oil and offshore sector to check how the RRSP can be adjusted.

The triangulation of data in this study is based on a literature review and semi-structured, open interviews. Triangulation of the data, which is done by using different sources, will increase the validity as it helps verifying the results (Yin, 1994). According to Patton (1987), triangulation is conducted through using different (1) data sources, (2) evaluators, (3) perspectives, and (4) methods. This study will use different data sources (data triangulation) and perspectives (theory triangulation) when developing the model, as a model describing the prerequisites must be able to separate case-specific prerequisites from the general prerequisites.

It was decided that to answer the questions, and identifying the different prerequisite factors of the RRSP, a model would be developed based on both existing literature and interviews with supplier organizations using the RRSP to uncover the missing perspective. Once the model is developed, it will be tested on MacGregor AS to identify any necessary measures that needs to be conducted for the adaptation into oil & offshore.

3.3 Case Study

The case is a study of the RRSP-usage in the aerospace industry, compared to the Norwegian Oil & Offshore sector. A description of the aerospace industry has been written in chapter 2.1.1. Currently, there are two research gaps concerning the usage of RRSP. These were limited investigation into the antecedents of RRSP-initiation, and secondly the missing supplier perspective on RRSPs. To perform the study, investigating both the output of the partnerships for the involved parties and the input factors of the partnerships in relation to the output, it was decided to include two supplier organizations, experienced in the use of RRSP. The buyer-perspective is already covered by other researchers in earlier case studies, and the focus of this study was hence to include the suppliers in the empirical research.

The two supplier organizations, company A and company B, are both very experienced in the use of RRSP in the aerospace industry. The following paragraphs will describe the characteristics of the different organizations.

Company A is a supplier of critical components for airplane engines. They have more than 30 years of experience as a risk and reward sharing partner on the engine sub-assembly. The respondent from this company was the customer relationship director.

Company B is a supplier with a wide portfolio of aerospace components. The company is a risk and reward sharing partner on both airplanes and other sub-assemblies of the airplane. Unlike company A, they have RRSPs on different types of assemblies, meaning they experience different business models and characteristics than company A. Respondents included two Global Key Account Managers for the Aerospace and Offshore divisions.

To test transferability, the case study included MacGregor AS, which is a major organization in the Norwegian Oil & Offshore sector. MacGregor is interested in adopting the RRSP due to challenges in their supply chain and are hoping the partnerships could improve the situations. The intention of the study is to assess whether it is likely that the experiences made in the aerospace industry are transferable to MacGregor, and if not, what changes needs to be made.

3.4 Data Collection

The data collection in this study is based on both primary and secondary sources. The primary sources were mainly the respondents of the interviews from the supplier organizations, whereas the literature review of RRSP and risk/reward sharing acted as secondary sources. The existing literature provide descriptions of the buyers' usage of the RRSP, and hence this study conducted interviews with the suppliers to also get their opinions and perspectives on the RRSP. In the end, interviews were conducted at MacGregor AS to connected to the model, as well as to build a general understanding of the business context.

Literature review

The literature review had two intentions. The first was to receive an understanding of the RRSP from the perspective of the buyers, whereas the other was to investigate benefits and disadvantages and what factors may influence these. In order to ensure validity, this literature review was based

on articles published in scientific journals. Articles used in the literature review were primarily found through Google Scholar and the reference lists in the case studies on RRSP.

In addition to only using journal articles, it was also placed an emphasis on controlling the quality of the cited literature. This was done using the database of “NSD - Norsk Senter for Forskningsdata” (Norwegian center for research data), which is a Nordic collaboration where the journals are constantly evaluated. This study preferred articles presented in higher ranked journals; however, all articles from journals in the database were considered. Articles from journals that were not recognized or ranked by NSD were not included in the literature review.

The study used mainly two different types of articles. The first type is those who directly describes the RRSP, or risk and reward sharing. The second type of articles where those who indirectly described the RRSP, which is articles about the aerospace supply chain coordination. Especially the second type of articles poses a methodological challenge, as one must be careful claiming that a finding is RRSP-related. This is because the article is not explicitly mentioning the RRSP, however, there exists knowledge of what companies are using the RRSP-contracts, as well as certain characteristics that makes it possible to identify if an aerospace article is describing the RRSP or not.

The outcome of the literature review was mainly two things. (1) The benefits and disadvantages with RRSP from a buyer perspective were uncovered, as well as examples of the business models used, and (2) the scope of the interviews were narrowed down using the four dimensions described in chapter 2.4 to ensure that the interview questions would focus on the relevant aspects and avoid trivial questions. The literature review also provided the basis for triangulation of the findings in the case study.

Semi-structured interviews

The aim of the interviews was to uncover antecedents and prerequisites of the RRSP, as well as to investigate the supplier perspective of RRSPs. The respondents were chosen from the aerospace suppliers that agreed to join the case study. These companies were contacted by using the contact network of MacGregor AS, which was the organization initiating this study.

The respondents have their strengths and weaknesses when considering validity and reliability. The strengths of these respondents are that they are very knowledgeable about how the RRSP is used in the aerospace industry, as well as being directly involved in every aspect of the formation and enforcement of the contracts. The limitations, however, is that they only represent the supplier perspective. The buyer/ OEM perspective was also desired; however, this study did not have any respondents from these organizations available, and the existing case studies are sufficient to understand why the

As this is an exploratory study, it is desirable to not place any restrictions on the respondents to uncover as much as possible. However, due to practical reasons it is necessary to place some limitations. This is mainly to prevent the interviews from lasting several hours, as this would prevent the respondents to participate. This caused the study to use semi-structured interviews, where the respondents were asked an open question, and then additional questions were asked to elaborate on interesting aspects.

For every question, I had a set of sub-topics that I wanted the respondents to touch upon during the conversation. These sub-topics were not presented to the respondent. This was to ensure that the respondent covered all aspects that I deemed necessary, without preventing the respondent to provide additional information. To ensure that data was correctly presented from the interviews, a recorder was used to first record the conversation, before transcribing the interviews.

3.5 Validity and Reliability

According to Yin (1994), the researcher needs to take into account that his/ her research design must maximize (1) construct validity, (2) internal validity, (3) external validity, and (4) reliability.

Yin (1994) describes each of the aspects as the following:

- Construct validity: Establishing correct operational measures for the concepts being studied.
- Internal validity: Establishing a causal relationship where it is shown that one conditions leads to another.
- External validity: Establishing the domain to which a study's findings can be generalized.
- Reliability: Demonstrating that the operations of the study can be repeated with the same results.

It was therefore necessary for this study to continuously keep these four aspects in mind when analyzing.

Construct validity

Out of these four, the construct validity is often the problem for case studies. This is because the researcher often fails to uncover sufficient operational measures, and that subjective judgements are used to collect the data (Yin, 1994). To ensure increased construct validity, it was decided to use multiple sources for triangulation and a less structured interview guide, that would consider that there might exist aspects that I was not aware of at the time of the interviews. By having the findings confirmed from multiple, independent sources, it is more likely that the findings could be replicated in future studies.

Jacobsen (2015) further describes that a common fallacy is that researchers often prioritize “exotic” findings over the less dramatic ones. This is because they appear more interesting than the findings that might be considered obvious, however, these are often very important as one cannot assume that anything is obvious. It is therefore necessary to not disregard any findings as too novel, as it has the potential of becoming a major weakness in the model.

Internal validity

Internal validity is important for studies trying to identify a causal relationship (explanatory case studies), where the researcher intends to claim that factor X led to event Y (Yin, 1994). In other words, internal validity depends on whether we describe the phenomena correctly (Jacobsen, 2015). Yin (1994) further explains that for case studies it might be difficult to ensure internal validity, as it is often necessary to infer that one event leads to another, based on an interview or observation. This study will use triangulation to of data to ensure that causality can be identified through pattern-matching of several, independent sources. Jacobsen (2015) states that a major limitation with using the in-depth interviews is that one must consider that the respondent might not be telling the whole truth, or if he or she is either intentionally or unintentionally withholding or misrepresenting information. The triangulation is therefore vital to ensure internal validity.

External validity

External validity concerns to what domain are the findings generalizable (Yin, 1994). This is problematic in qualitative case study research, because it does not provide a statistical basis for generalization, but rather an analytical basis. This is because the sample size is usually very limited, and not representative for the entire population of the phenomena (Jacobsen, 2015). Yin (1994) explains that statistical generalization is necessary, however, it is possible to apply a logical approach in order to evaluate whether one can expect to replicate the same results in another case. In this study, where the discussion is whether the RRSP is adaptable in other industries, the external validity is a central element. Since the model is descriptive of a single case, it lacks the element of statistical generalization.

However, this does not mean the study lacks the necessary components to provide theory generalization. Yin (1994) explains that aiming for statistical generalization in case studies is a common fallacy as the researchers often consider their respondents as samples, when they should rather be considered experimental subjects the same way a laboratory investigator selects a new experiment. By ensuring a proper selection process for the subjects, it is possible to argue that the findings will have a basis for analytical generalization.

In essence, there are two elements that affect the external validity in qualitative research, and these are (1) number of data units and (2) the selection process of the units (Jacobsen, 2015). The more units that are being investigated, the higher likelihood that the findings are generalizable. One could argue that the selection in this study is too limited, however, there is a very limited number of actors in the aerospace industry, and the literature review of case studies covers several of these companies. The respondents also have several projects with the RRSP-model, meaning that even though there are few respondents, they cover a wide variety of projects and examples. This provides the basis for analytical generalization in this study. It is still recommended that future studies should aim for statistical verification of the findings in this study.

Reliability

The final methodological aspect is the reliability of the study. This concerns whether another study, with the same approach will be able to reproduce the findings and conclusions (Yin, 1994). The reliability of this study is based on a mix of the three previous dimensions of validity, as the results

in this article will be based on recurring observations from the respondents. It is expected that the findings will be reproduceable, as the findings in the interviews are in line with findings in the literature review. In addition to this, it is possible to identify a relationship between the RRSP-benefits, and established theories such as transaction costs approach and principal-agent theory.

However, since this is a social construct it is expected that there will be deviations. The phenomena RRSP will be experienced differently by whoever is observing it, and a future study would be likely be able to expand on the model presented in the following chapters. To ensure reliability, a case study data base is developed in the literature review, and included in appendix A.

4 Findings and Discussion

The interviews in this case study was conducted based on the dimensions identified in chapter 2.4 to identify the necessary information to answer the three research questions. From the theory it was expected that four dimensions were more interesting to investigate. This is because previous case studies have mentioned aspects of these four dimensions in their work, leading to the assumption that once the output was established, the prerequisites of RRSP usage could be uncovered by these dimensions.

The dimensions are the characteristics of (1) product and (2) market situation, (3) strategic intention for using the RRSP, and (4) the business model used in the partnership. The interviews were conducted with two suppliers in the aerospace industry, to ensure that the supplier perspective of the RRSP is covered as well. The findings from company A are summarized in appendix B, whereas company B is summarized in appendix C

The discussion will follow the structure presented earlier, illustrated in Figure 9, starting with identifying the output dimension of the RRSP through RQ. 1, before identifying the input dimensions through RQ. 2. Once RQ 1 and 2 are answered, it is possible to develop a model describing the current use of RRSP in the aerospace industry, before assessing its degree of transferability to oil & offshore, using MacGregor AS as a case study.

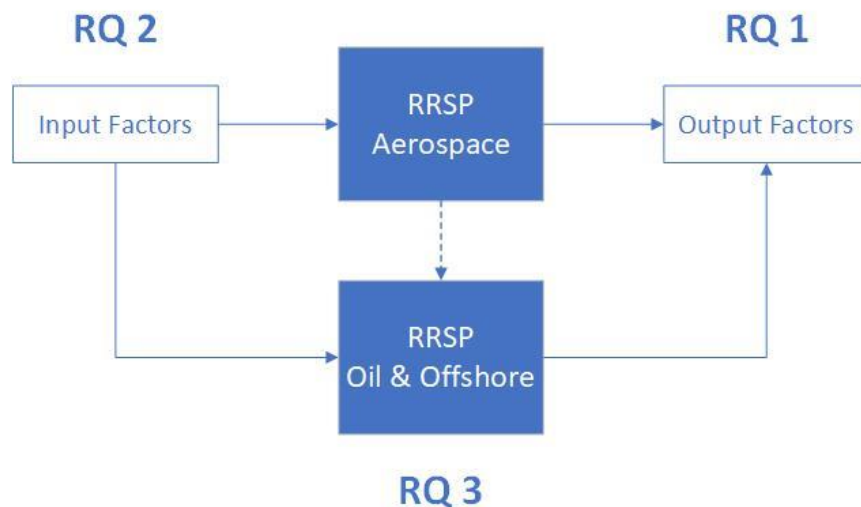


Figure 9 The research questions of this study

4.1 Benefits and Disadvantages of RRSP – The Output Dimension

The first research question presented in this study is concerned with identifying the output from RRSPs. The output dimension is defined as the results of adopting the partnership model, which is summarized as a set of benefits with associated disadvantages. This was because the adopting organization is hoping to achieve a set of benefits, however, there will be a trade-off as they will have to accept certain disadvantages as well. This results in the following research question:

RQ1: “What are the benefits and disadvantages of RRSP from both the buyer and supplier perspectives?”

This section will discuss the four dimensions of buyer benefits, buyer disadvantages, supplier benefits, and supplier disadvantages before summarizing the findings in a table at the end of the chapter.

Buyer Benefits

For the buyer, several of these benefits have already been identified through earlier work presented in chapter 2. These studies identified three main strategic intentions for adopting the RRSP. These were to (1) gain easier access to funding (reduced dependency on loans), (2) reduce the commercial risk, and (3) secure long-term relations with key suppliers. According to these studies, adopting the RRSP has reduced the problems associated with these three strategic intentions.

Apart from these benefits, the case studies also emphasized additional benefits, such as reduced lead times, increased supply chain transparency, and an alignment of goals between the organizations. The last two benefits, the increased supply chain transparency and alignment of goals between the involved parties, was also identified by the respondents in the interviews as important benefits for the buyers in the partnerships.

All of these benefits appeared in the interviews as well, normally through the discussion regarding the business case. However, there was not provided any further buyer-benefits from the respondents, which might not be surprising considering the respondents represent the supplier-perspective. Yet, since they confirmed the same benefits that were unraveled in the theory, it is reasonable to assume that on a general level of RRSP usage, these are the most prominent benefits.

From company B it was discussed how the RRSP provided increased supply chain transparency. They explained how the partnership ensured that their customer understood that the price they charged was fair. This is because the cost needs to be disclosed to establish the ownership-percentages, and this results in increased trust. However, it appears that the increased supply chain transparency is in conflict with what the theory claimed about aerospace partnerships, as they were characterized by higher levels of distrust due to their desire to maintain their competitive advantage through secrecy. If the partners were truly willing to share vital information like this it means that either there is a lot of initial trust between the partners, or that the long-term nature of RRSP is a sufficient incentive to disclose more information between the parties.

Furthermore, company B also discussed how the RRSP actually made them act differently, as an example of goal alignment. Company B claimed they invest directly in their customers products or technology at the expense of investments in their own technology. This is because it was considered in the best interest of the final assembly, and hence in the best interest considering commercial success. In other arrangements there might be a difference between what is best for the supplier and commercial success, resulting in diverging goals. This is one of the agency problems that was described in the chapter on agency theory, where there is a difference in attitude towards risk between the principal and agent, resulting in divergence in preferred actions. This indicates that the RRSP is capable of solving certain agency problems by altering the behavior of supplier to create goal congruence.

It was described that two of the measures the principal can use to ensure that the agent is working in its interest is to use outcome-based contracts or ensure that the principal has more information than the agent. By using the definitions of the outcome- and behavior-based contracts, it is evident that the RRSP can be defined as an outcome-oriented method of contracting. This is because the entire partnership model is based on the concept of revenue sharing, which is measured based on commercial success and the outcome of the partnership.

By using the three original strategic intentions, it is possible to explain how the formation of the RRSP is to solve transaction cost challenges. The first strategic intentions considered the use of investments from suppliers to reduce the dependency on loans. This will eliminate the cost of interest rates if present. The second strategic intention aimed at reducing the commercial risk, and related costs of unsuccessful products. The costs of unsuccessful products are likely to be an

important motivator from the buyer perspective, since it was described in the study of the aerospace industry that few of the airplane-models turns out to be profitable, and the RRSP is hence favorable as it results in a smaller loss for the buyer.

The third strategic intention from the origin of RRSP, securing long-term relations with key suppliers, is also as expected based on transaction cost theory. The suppliers in the aerospace industry is described as having scarce and vital competence, while still operating in an oligopoly, meaning two or more producers (buyers) will make up most of the market. One could hence ask if it would be better from a transaction cost perspective to assume control over the supplier's operations. However, the aerospace suppliers are diversified across multiple industries, using the same technology on multiple products. This results in a medium to high idiosyncrasy of the components at most. Based on the figures from Williamson (1979) presented in the chapter on transaction cost perspective, it is proposed that products with high levels of idiosyncrasy combined with a recurrent nature of the transaction favors relational contracting, such as the RRSP. The answer to the make-or-buy question is therefore a result of the buyers' inability to generate economies of scale, as well as diversifying a potential costly outcome from the high commercial risk.

Buyer Disadvantages

When considering the disadvantages of RRSP, it was discovered from previous empirical research that the largest disadvantages of the RRSP are associated with poorly conducted execution (Wagner & Baur, 2015). However, when discussing disadvantages arising from the RRSP itself, and not just from misconduct, there are still a few. The first disadvantage from the buyer perspective is connected to the trade-off between risk and reward sharing. When the supplier assumes a part of the commercial risk, they are in essence purchasing a part of the revenue base from the buyer. Therefore, this disadvantage is the result of a trade-off, where on one side the buyer is giving away parts of their revenue base and will in return ensure investments for their upcoming product. This was emphasized by company A, as they were adamant that the buyers could not have the strategic intention of increasing revenues when using RRSP as they let suppliers perform the investments, with the expectation of receiving a return on the investments, instead of acquiring funding elsewhere.

The second disadvantage is that the RRSP is disincentivizing quality. Tse et al. (2018) discovered that risk and reward sharing used together have a negative effect on quality performance. They assumed that the reason for this was that the risk sharing aspect of the contracts constitute an accepted “bottom line” for quality, whereas the reward sharing is promoting increased quality due to the potential long-term benefits for the supplier. However, in the interviews with company A, it was discovered that the only unsuccessful RRSP product company A have participated on (unsuccessful meaning that they failed to meet the expectations in the business case) was when they produced components of too high quality. This resulted in the components not needing replacements, which in turn meant they missed out on the profits from the aftermarket.

This is interesting, as it provides another perspective on the issue. Tse et al. (2018) proposed that this reduction in quality arises from the suppliers’ wish to produce the bare minimum. However, this finding suggests that the suppliers are actually punished for delivering high quality components, as it reduces income from aftermarket sales. As a result, the reward sharing in the RRSP is incentivizing lower quality, because suppliers are rewarded based on commercial success.

This is much in line with the previous discussion regarding the incentives of RRSP, as it is interesting that outcome-based contracting has been used even though there is a low outcome-measurability (not considering commercial success). The PA-theory also suggests that long-term agreements such as the RRSP should favor behavior-based contracting, as long-term agreements will foster goal congruence.

Holmstrom & Milgrom (1991) claims that outcome-based contracting is best for controlling the behavior of an agent. However, using single-criteria performance contracts such as the RRSP is not optimal according to other scientific studies. When considering the concept of incentive intensity (the additional money paid to an agent for additional performance) introduced by Zenger & Marshall (2000), it is explained that to ensure the most efficient incentives for maximizing performance it is necessary to introduce as many performance measures as possible. Van der Stede (2009) provides further evidence that the supplier will only put in an effort to excel at the criteria that is measured. To ensure the best possible performance, the organization should put in many, smaller measures to generate the desired behavior. However, the RRSP is only focused on commercial success, meaning that from both an agency and incentive perspective, is not optimal for solving agency problems. From a principal-agent perspective, it is evident that the formation

of RRSPs and its incentives have emerged as a result of the high levels of performance ambiguity, as well as significant information asymmetry in favor of suppliers (as described in study of aerospace industry).

The second disadvantage, concerning quality performance is not necessarily a problem in the aerospace industry, as there will be a minimum requirement to quality in the RRSP. This is because of the excessive requirements to quality and safety, meaning there will be ensured a minimum quality regardless of the involved parties' strategic intentions. If the RRSP is transferred to other industries without regulations ensuring a minimum quality, it is important that clauses regarding this is included in the contract.

Furthermore, it indicates that the RRSP is not likely to prove a favorable partnership if the strategic intention of the buyer is to acquire the best possible quality. This is in line with the discussion earlier about incentives, as using commercial success as an incentive is not ideal, however, it is likely that the circumstances in the aerospace industry (low outcome measurability and high levels of performance ambiguity) does not favor the use of many different incentives. Apart from these disadvantages, there also appears to be a heightened risk of failure if not conducted properly. This was especially apparent in the case study of Boeing's Dreamliner by Denning (2013), and emphasized by Wagner & Baur (2015) who claimed that the only problems with RRSP arise from misconduct or lacking competence from buyer or supplier. The model should therefore include a dimension that also considers how to prevent these potential disadvantages.

Supplier Benefits

The supplier perspective was a major focus during the interviews with the supplier organizations. When discussing the benefits and disadvantages with the respondents in the case study, it was necessary to define what the different organizations regarded as a successful RRSP. All used the phrase "meeting the expectations of the business case", in one way or another, to determine if the RRSP was successful.

Based on the case study, it was primarily two benefits that were emphasized by both organizations. These benefits were the potential for increased profit potential (on behalf of the buyer's profit potential), and the stability provided by receiving long-term, predictable revenue streams. On top of this, it provided the suppliers with a closer relationship with the buyers which they consider

beneficial for future partnerships. The final benefit is concerned with the access to the aftermarket, as the RRSP allows the suppliers to reap the benefits of lifecycle revenues, without having to handle the logistics and customer relations, as this is done through the existing customer relationship between buyer and end customer.

Especially company A appeared to be very satisfied with the RRSP collaborations and gives it the credit for why their profitability is much higher than the industry average. This is allegedly due to several factors; however, the aftermarket/ spare parts market is given a significant amount of credit. It is uncovered that several of the assemblies in this partnership are usually sold at discount, with the intention of recouping this through the significantly higher profit margins on the spare parts. In the RRSP, the supplier will get a percentage of the revenue, meaning that if a component is sold at a higher price, then company A will get more, instead of just the standard price per unit that the standard LTA provides.

Company A described that it was challenging to access the aftermarkets without cooperating with the buyer. This is because of the excessive regulations has resulted in a market where the use of non-original parts from other service teams than the OEM is not possible or very common. However, in the interviews with company B, it was uncovered that they are in fact able to access the aftermarket without going through the buyer, despite the existence of such regulations. It is therefore expected that company A's role as a supplier to an engine producer makes it harder to access this aftermarket, as they will have to go around both the engine producer and the airplane producer to access the customers. However, company A emphasized that they would not hijack the aftermarket even if it was possible, as it would undermine the industry. Company B similarly stated that the RRSP was a more favorable option as well, as it would provide them with the aftermarket profits without having to deal with the supply chain logistics and coordination that is usually necessary.

Even though the role of the aftermarket is important as a motivator in the aerospace RRSP, they are not standard to the contracts. Company B explained that they used the RRSP on assemblies that not necessarily had a service period after the product sale. However, for products that have an aftermarket phase, this is where the profits are generated. If a component is sold here, then the profit margins will be significantly higher. By participating in this market, it is possible for the

suppliers to benefit as well, however, company B serves as an example that the RRSP is applicable to other situations as well that will still provide long-term predictability in the revenue streams.

Buyer Disadvantages

These benefits are not without disadvantages. The RRSP forces the suppliers to contribute significantly larger investments in the product than they normally would, as well as extending the payback periods. In traditional procurement situations, the suppliers are paid once the product changes hands, however, as co-owners they are not paid before the final assembly is sold. This means that the supplier would need to have a significant savings account or access to profits elsewhere, to both contribute and stay alive during development, production and sales phases of the product life cycle.

Another disadvantage for the suppliers is that they as co-owners of the product will assume a greater commercial risk. The reward sharing aspect also imply a “loss sharing”, meaning that the risk and reward sharing partners will have to cover their share of any potential losses and warranty claims. It is yet interesting that the suppliers, despite their long experience with RRSP, had no negative experiences with the partnerships, given that the business case is realized.

In the following Table 1, the benefits and disadvantages discussed throughout this chapter is summarized, from both the buyer and supplier perspective. The majority of which is uncovered through the interviews.

Table 1 Benefits and disadvantages of the RRSP

	Buyer	Supplier
Benefits	<ul style="list-style-type: none"> • Easier access to funding/ Reduced dependency on loans. • Reduced commercial risk. • Fewer suppliers, with greater responsibility. • Reduced lead times. • Closer relations with suppliers. • Increased SC transparency. • Goal congruence (commercial success of product). 	<ul style="list-style-type: none"> • Long-term, predictable revenue streams. • Closer relations with buyer (future projects). • Potentially higher rewards. • Direct access to the spare part market (life-cycle revenues).
Disadvantages	<ul style="list-style-type: none"> • Reduced revenue potential. • Reduced incentives for quality performance. 	<ul style="list-style-type: none"> • Longer payback period. • Locking up capital. • Higher commercial risk

It is evident that from the buyer perspective, the RRSP was designed to solve transaction cost issues, such as the make-or-buy decision. However, additional benefits can be linked to the agency theory as it is clear that the RRSP is used to alter supplier behavior as well. The challenge with the agency benefits is that there are some deviations from the original propositions, most notably regarding the outcome characteristics of the aerospace industry. The high outcome uncertainty and measurability, combined with theory on incentives suggests that the RRSP is not optimal for solving agency problems, although it is likely that it will solve some.

The supplier perspective on the other hand is associated with the competitive situation of the contractual parties. The favorability of these benefits is most likely due to the supplier's dependence on their buyer, which is also likely to be why the profit margins are higher in the RRSP constellations. If the buyer-supplier relationships are dominated by the supplier, it is likely that the profit margins and long-term security would already be in place, meaning the RRSP is not likely to be very favorable.

It is also worth noting that both company A and B stated they were actively seeking out long-term partnerships, which is one of the reasons they find the RRSP favorable. This could be linked to their competitive situation, as both companies are arguably the lesser part in the power relations with their customers. This is in conflict with what was described in the literature review, as the literature review described the relationships as supplier-dominated due to the buyer's heavy dependence on few, specialized suppliers.

Even though these descriptions of the competitive situations are in contrast, it is reasonable to believe that the suppliers are actually more dependent on the buyers than first assumed. This is based on the reasoning that there are two major producers in the aerospace industry, and even though the suppliers are diversified, the aerospace divisions in these supplier companies will rely heavily on the few projects presented by the buyers. This was emphasized by company B, as even though they were diversified, company B's aerospace division was heavily dependent on their customers. Hence, it would be interesting in future studies to investigate whether the power relations in the market is a factor contributing to making the RSP more viable, or if especially the suppliers will still find the RSP attractive if they do not need to secure these long-term relationships due to monopolistic tendencies. The current findings suggest that RRSP is more favorable for supplier organizations that are heavily dependent on their customers.

4.2 Prerequisites of RRSP – The Input Dimension

Once the first research question is answered, it is necessary to identify the input dimensions of the model that will result in the realization of these benefits and disadvantages. To identify these factors, the following research question was created:

RQ2: "What are the prerequisites of entering an RRSP?"

In chapter 2.4, four dimensions were identified that appears to affect the use of RRSPs. These were the characteristics of the (1) product and (2) market, (3) the strategic intentions for adopting the RRSP, and (4) the business model. By initiating interviews with the intention of investigating these, it was expected that it would be possible to understand what has made it possible to achieve the benefits and disadvantages of RRSP in the aerospace industry. This chapter will first discuss the findings within these four dimensions, before proposing a set of prerequisites of the RRSP.

4.2.1 Characteristics of Products

The first dimension from chapter 2.4 was the product characteristics. Previous research identifies product characteristics as important for investing in RRSP. Products suitable to risk and reward sharing contracts tend to be described as very complex and expensive, with high requirements to quality, safety and national security. Due to this complexity, there is a high level of performance ambiguity related to the production of these products, apart from the commercial success. The lifecycle of the products includes a design/ engineering phase, and a following MTO (make to order) phase, with high sales volumes.

The findings from company A suggested that this was a fitting description, as the engine components are very costly and with high sales volumes. They are also tailored to each product line, meaning it requires a design phase before entering the MTO phase where components are delivered on order.

However, there were some deviations. The first problem was that it is challenging to quantify complexity, but there is reason to believe the components are to some degree complex as company A has specific knowledge that the buyer requires, however, since the buyer is able to design them themselves and order them from several producers, it is reasonable to believe that the complexity is not too great.

When considering the performance ambiguity, there was no definite answer. It was discovered that since some of the components are replaced once they break, rather than after a set interval, it is possible to assess performance to some extent for some components. However, apart from this, there is a considerable performance ambiguity as the individual components effect on the greater assembly is hard to define.

However, the findings from company B indicates that the description of product characteristics is too specific. Whereas company A presented several findings that were in line with the expectations made from the theory, it was discovered in the interviews with company B that the characteristics of the product cannot be described that specifically. This is because when asked how company B uses the RRSP, and on what products, it became apparent that the RRSP is applied on almost anything. There were no major similarities in complexity, component costs, volume of sales, as

company B revealed that they deliver assemblies and components that vary from simple valves to larger, complex systems.

There was, however, one characteristic that implicitly was present in both companies and the literature review, and that was the total cost of the assembly. RRSP is only used when the total cost levels of the contractual relation are high. This is in line with the TCA, which claims that complex contracts are expensive. The RRSP is a very complex contract, which has been emphasized by both companies, and hence the total value of the contract needs to be high enough to justify the excessive resource usage associated with the RRSP.

4.2.2 Characteristics of Markets

The second dimension identified as central for RRSP was the market characteristics in the aerospace industry. It was expected that the market characteristics could explain why the RRSP has become a viable choice for the parties in the aerospace industry. The characteristics included the competitive situation, which was an oligopoly with few producers without all the necessary knowledge to produce the assemblies. The suppliers are according to theory few and diversified across other industries, resulting in supplier-power in the contractual relationships. On top of this, the partnerships were based on distrust due to the suppliers' desire to protect their knowledge, which is their competitive advantage, and because the producers are pressured by individual states to include national suppliers.

However, these market characteristics were not discovered in the organizations in the case study. Both company A and B operated in oligopolies as well, even though they are in different segments of the aerospace industry, but this is where the similarities ended. When considering the characteristics regarding the supplier's competence and competitive advantage, it was uncovered that company A's competitive advantage is associated with the production rather their expertise, as the buyer can design the components themselves and acquire the components through long-term production agreements with other suppliers. Company B on the other hand have a very large product portfolio and delivers all types of components and systems. It is therefore likely that the characteristics regarding the supplier's competence is not associated with the favorability of RRSP. However, when considering the competitive situation, it appears that there is a connection between the situation of the individual supplier and the RRSP. Company A is not diversified across industries either, meaning they are dependent on the few available projects. Combined with the

number of competitors, it is evident that they are heavily dependent on the buyers, and not the other way around as was implied by the market study. Company B on the other hand is one of the companies that the literature described as diversified, meaning they should in theory not be dependent on the buyer as they have other opportunities elsewhere. As this may be true on an organization-wide level, it was clear that the different divisions are somewhat isolated, meaning that the aerospace division is very dependent on the buyers.

The theory therefore suggested that the market situations where RRSP is used should be in favor of the suppliers, however, the case study has not identified such competition. It was rather the opposite, as the suppliers are very dependent on the buyers, and hence it is not surprising that the long-term opportunities are a satisfying incentive.

Finally, it was not discovered any distrust or hostility between the involved parties in either company A or B. On the contrary, both companies experienced a rather higher level of trust, which was evident as they were asked by the buyers to participate based on merit, and not from a competitive bidding. The market study insisted most partnerships were initiated as a result of either insufficient selection or governmental pressure, however, the RRSPs appear to have a prerequisite element of trust present. This is likely because the RRSPs require the supplier to assume a greater risk through the sub-assembly ownerships, meaning the buyer needs to ensure that the suppliers can perform the necessary operations. From the Dreamliner case study, it is evident that insufficient screening of the suppliers can end in undesirable results.

Likewise, company B insisted that the RRSPs require a significant trust from the supplier-side as well. The supplier will invest heavily in a product, and the supplier must therefore be confident that the products will become a commercial success. According to company B, this is achieved through understanding of both market and product.

4.2.3 Strategic Intentions

The third proposed dimension concerns the original strategic intentions of the involved parties for adopting the RRSP. For the buyer perspective, this was described by the three intentions uncovered in the theory. These were the desire to get easier access to funding, reduced commercial risks, and to secure long-term relations with key suppliers. Furthermore, it is possible to draw parallels

between these strategic intentions to the transaction cost theory as performed in the discussion of research question 1.

Based on this discussion, it is argued that the RRSP is primarily a tool to solve transaction costs problems such as the make-or-buy question. The partnership is a method to move towards complete equity control in the make-buy continuum, in situations where the buyer is unable to assume full control of production for various reasons.

However, when also considering the discussion from the previous dimension, the market characteristics, it was uncovered that the RRSPs are formed with suppliers they already trust. This is interesting, as the market characteristics described that there is a high share of hostile partnerships, due to the role of competitive advantage and limited supplier selection. This suggests there is a dimension of trust involved in the formation of RRSPs from the buyer's perspective.

4.2.4 Business Model

A lot of emphasis has been placed on the business models used by the producers in the aerospace industry, which provided reason to believe that another dimension of the prerequisites would be associated with the business model, and how the parties realize the benefits and disadvantages of the RRSP. Although the definition of an RRSP according to Figueiredo et al., (2008) was that there is an active sharing of risk, with the promise of future revenue, there are certain aspects of the partnerships that appear common in the aerospace partnerships. The foundation of the partnership is built on the idea of risk and reward sharing, and in practice it means that the partners are given the ownership of a sub-assembly. This is done through the tiered system, where tier 1 suppliers are responsible for their own assembly, while coordinating their tier 2 and 3 suppliers.

The partner is hence responsible for covering the development, production and refinement costs of this assembly. In return, the partner will be provided with a percentage ownership of the total assembly, that is decided based on different factors, among the aforementioned costs. This ownership percentage guarantees the partner life-time revenues from the products and provides the supplier with access to the service markets for the products.

This way of designing a business model was in line with the findings in the case study. Company A explained that they paid an entry fee and covered the costs of production and development, however, the access to the aftermarket is one of the main benefits in this business model. Company

A delivers components to the buyer, which further distribute the components to the customers. In order to ensure that the involved parties receive their entitled share, there is a constant redistribution ensuring the percentage of the revenue is correct. However, the cost aspect is not a part of the agreement, and if the company is able to reduce their internal production costs, then it will not affect the future revenues.

Company B on the other hand, which have a significantly more diverse product portfolio, explained that there is no distinct business model for RRSP, apart from the supplier assuming ownership of the sub-assembly. However, this ownership can be awarded through pure financial contributions as well as ownership through direct product development. There is also no fixed payment structure, as this will depend on the product characteristics. As explained earlier, it was discovered that product characteristics does not directly exclude the use of RRSP, and by an extension, there will not be one specific business model that defines the RRSP.

This is not surprising, as the principle of RRSP is that the suppliers will get a fixed percentage of any revenue. This means that once it was discovered that product characteristics were not fixed, then it would result in the business model not being fixed either. However, the findings in the interview implies that product characteristics automatically decide the fundamental structure of the business model, as the revenue streams will be divided anyway. The significance of these findings is therefore that the RRSP is not dependent on either product characteristics or business models.

4.2.5 Other Findings

Due to the semi-structured nature of the interviews, there was an opportunity for the respondent to discuss aspects of their partnership that was not covered by the four initial categories. These still had significance and will be discussed in this section.

In the interviews with company A, it was uncovered that the RRSP require the supplier to have solid financial capabilities. This is because the supplier will have to cover the significant investments that previously had been covered by the buyer. The need for solid finances is increased by the longer payback periods, as the company is not likely to experience revenues in the first years after initiating the RRSP.

The interviews with company B, however, provided more findings in this dimension than in the original four. This is because of the high levels of deviation between the findings in company B and the dimensions in chapter 2.4. However, the findings are not necessarily in conflict, as it is discovered that the reality in company B is more general than the expectations created by the theory in chapter 2.4. Because of this, several of the findings from company B have already been presented throughout the discussion to emphasize deviations from the expected theory. However, the high deviations from theory indicate that the RRSP is already quite adaptable, as it is already used in diverse situations within the aerospace industry.

Company B is also aware that the RRSP contract needs to exceed a threshold value for the RRSP to be viable. This was also discussed earlier with the product characteristics of company B's components, as it was discussed that RRSP viability is not dependent on the characteristics of the product. The proposition is rather that the financial value of the contract needs to be high enough to justify using an RRSP. The factors identified in chapter 2.4, such as component cost, volume, complexity, etc. can all contribute to increased assembly cost. It would hence not be wrong to claim these are contributing to the overall requirement, which is that the value of the contract needs to be high enough to justify an RRSP.

4.2.6 The Requirements of Using RRSP

Based on this discussion, it is possible to discuss the prerequisites of RRSP constellations. However, before discussing prerequisites and their relation to the different outcomes, it is believed there will exist a set of absolute requirements for initiating any RRSP, regardless of what outputs that are desired. These required factors can be considered a foundation for any RRSP contract, and are summarized as the following:

- Financial magnitude of contract.
- Buyer trust in supplier.
- Supplier's trust in the buyer's product.
- Financial capabilities of supplier.

Financial magnitude of contract

The first required factor, the financial magnitude of the contract, has been hinted at throughout the discussion. It was discovered that the RRSP is not dependent on any specific characteristics of the products, as it is used on everything regardless of complexity, unit costs, specificity, volume and so on. What was discovered instead was that all the RRSP contracts appear to be very expensive. Company B also informed that the RRSP is only applicable after a certain threshold value is reached, as the RRSP is very expensive to both initiate and enforce. It is hence necessary to have a high financial value to justify spending such considerable resources on the RRSP.

This is very much in line with what one should expect from the transaction cost theory. The fundamental contractual assumption was that contracts of higher complexity are more expensive, and this influence the make-or-buy decision. In addition, the suppliers in the aerospace industry is not delivering solutions to a single buyer, as the technology behind the components are usually sold to other airplane producers, as well as buyers in other industries. This suggests that the suppliers to a greater extent should be able to achieve economies of scale, which means the buyers should opt to buy in the market while reducing the relational transaction costs. This was also described by Williamson (1981) as the partnership should be used when there is a high degree of recurring purchases with an idiosyncratic level of asset specificity.

Based on both the practical and theoretical assumptions, it is hence proposed that the first required factor is that there is a high monetary frame of the RRSP contract. This can be achieved through several contributing factors. These factors are anything that in general gives rise to transaction costs, such as uncertainty, frequency of acquisition and asset specificity, but it can also be product specific characteristics such as component complexity, cost, volume, or technological ownership.

Trust

The second required factor can be described as trust. This is either the buyer's trust in the supplier's abilities, or the supplier's trust in the product. A recurring statement in the interviews was that since this is a partnership that is being used throughout the lifecycle of the product, it is necessary for the involved parties to have the necessary level of trust to commit for such an extended period of time. This trust goes both ways, as in an RRSP the suppliers are no longer simply supplying a product to a greater assembly, but they are co-owners of the final product. This means that the

suppliers must have trust in that the product will be a commercial success. Through the case study, it was discovered that this trust was generated through the business case and type of business model, but it was also necessary for the supplier to have an in-depth understanding of both the product and market to verify the business case.

Likewise, the buyer needs to be able to trust that the suppliers to have the necessary competence to avoid additional disadvantages. These disadvantages can be emphasized using the case study of Denning (2013) on the 787 Dreamliner. This product was affected by poor execution from several of the partners, and it was apparent that there had been insufficient effort from Boeing in ensuring that the partners had the required competencies. This is likely why the suppliers are chosen on merit, and not through competition. It also appears that the buyers prefer recurring risk and reward sharing partners, which is illustrated by the opportunity company A had for first refusal.

Financial capabilities

The final requirement is directly linked with the supplier organization's readiness to use the RRSP, which is summarized as the financial capabilities of the supplier. This represents two sides of the same issue, as it describes a situation where the buyer is not able to fund the project development alone, and that the supplier have the necessary financial strength to cover these investments, in addition to postponing the revenue streams.

The financial strength of the supplier is a necessity, as the supplier will not be able to participate in the product development without having the required stability to survive until the profit appears in the future. This is because in a traditional STAs or LTAs, the revenue is generated once the buyer purchases the component, whereas in the RRSP, the supplier will not receive revenue before the buyer has been able to sell the product.

However, the financial capability of the buyer is not necessarily a required factor, but it tends to explain why the buyer chose to implement the RRSP in the first place. By using the RRSP, the buyer is essentially giving away parts of its potential future revenue, which is not something one should expect unless the buyer gets something in return. This is because they are forced to give away the revenue potential due to missing funds, however, it is also reasonable to believe that the buyer could accept a lower potential revenue to achieve the other benefits as well. Therefore, the financial capability of the supplier is a requirement.

4.2.7 The Prerequisites of RRSP

Once the foundation for any RRSP constellation is identified, it is possible to uncover the prerequisites for the different outputs. The output was described as the benefits and disadvantages of using the RRSP, and it is hence necessary to discuss the prerequisites of the individual outputs, as not every output is necessarily present in every RRSP.

Table 2 The Outputs and Connected Prerequisites

	Output (Benefit/ Disadvantage)	Prerequisites (Contextual Explanation)
Buyer benefits	Easier access to funding	High cost levels Buyer cannot afford
	Reduced commercial risk	High cost levels Uncertain demand Excessive req. to safety
	Fewer suppliers, with greater responsibility	Market situation Complexity
	Reduced lead times	Assemblies that can be produced in parallel
	Closer collaboration with suppliers	Market situation Few suppliers
	Increased SC transparency	Supplier's desire to protect competitive advantage Distrust
Buyer disadvantages	Reduced revenue potential	Giving away investment opportunities
	Reduced incentives for quality performance	Focus on commercial success Regulations prevent disadvantage in aerospace
Supplier benefits	Long-term, predictable revenue streams	Market situation Buyer-power
	Closer relations with the buyer	Few available projects
	Potentially higher rewards	Buyer purchase at fixed price Access to aftermarket
	Direct access to the spare parts market	Regulations prevent entry
Supplier disadvantages	Longer payback periods	Direct result of the RRSP, meaning supplier will be forced to assume more risk
	Locking up capital	
	Higher commercial risk	

The summary in Table 2 presents what contextual factors, or prerequisites, can describe why the benefits and disadvantages have been realized in the aerospace industry, or why the benefits appear to be favorable.

4.2.8 The Model for Cross-Industry Adaptation

The discussion so far has uncovered the first three dimensions of the RRSP, which is the required and output factors, as well as the different prerequisites for these outputs. The dimensions have been described using both empirical observations, case studies and grounding theories such as the transaction cost theory and agency theory. This results in the following model illustrated in the following Figure 10.

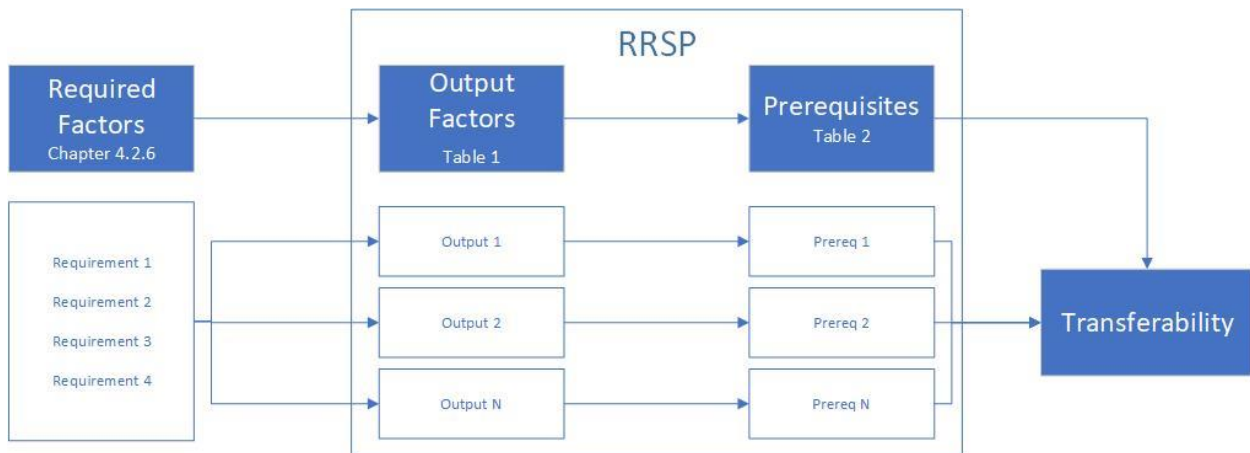


Figure 10 The Model for Cross-Industry Adaptation

Reading from left to right, this model proposes that there is a set of requirements for using the RRSP, regardless of the strategic intentions of the adopting party. If these requirements are satisfied, then the next step is to identify the desired benefits, before assessing whether the contextual situation favors the use of RRS partnerships. If there is an alignment between the prerequisites and the context of the new situation where the RRSP is considered, it is likely that the adoption will conserve the benefits. If the situations differ, then it is possible that complications might arise.

The required factors, described in chapter 4.2.6, consisted of primarily four factors that must be present in the partnerships. These were the (1) financial magnitude of contract, (2) buyer's ability

to trust the supplier, (3) supplier's ability to trust the RRSP-product, and (4) supplier's financial capabilities.

The second dimension covers the benefits that have been experienced in the aerospace industry. This is the output of the RRSP, however, when considering adopting a new model, it is primarily to achieve one of the outputs. Following this logic, the output dimension will be first in a model enabling cross-industry adaptation, presented in Table 1 in chapter 4.1. This dimension is preceded by the input factors, which describe what has made it possible in the aerospace industry to achieve these benefits. These were described in Table 2 the previous chapter, 4.2.7.

The final step in this study is to evaluate the degree of transferability of the RRSP. Since the RRSP is used in various situations in the aerospace industry, it is already showing a certain degree of adaptability to different situations, however, it is necessary to do a case-by-case evaluation. This study will use MacGregor AS as a case study to evaluate whether the RRSP may be adapted to their supply chain, to solve certain challenges.

4.3 The Transferability of RRSP – Case Study with MacGregor

The final step of this study is to assess whether it is possible to use the RRSP in other industries. This will hence be the final dimension of the model. Once the necessary benefits are identified, the associated prerequisites need to be compared to the new situation, resulting in an evaluation of transferability. This is answered through the following research question:

RQ3: "Is the RRSP transferable to other industries?"

To answer this research question, MacGregor AS is used as a case study. MacGregor experiences some challenges in their existing relationships and are considering whether the RRSP could be a viable option to face these challenges. However, before assessing whether the RRSP is a viable option for MacGregor, it is necessary to evaluate whether the RRSP is transferable at all.

4.3.1 The Transferability of RRSP

There is no reason to believe that the RRSP is not transferable to other industries. This is because the RRSP is already used on quite diverse products and components, with several business models which are not specific to the aerospace industry. Furthermore, it is possible to explain the emergence of the various benefits using mainly the competitive situation and the commercial risk

present in the industry. Although the competitive situation in the aerospace industry is unique, it should be possible to reproduce the conditions elsewhere. The competitive situation is influenced by a mutual dependence, where there is significantly buyer-power, however, the suppliers are also scarce, resulting in both parties wanting to secure long-term relations with each other. The commercial risk aspect of the products in the aerospace industry also contributes to making the RRSP possible, however, this is not exclusive for this industry.

When also considering that the two main components, the risk and reward sharing, predates the RRSP as independent contracting mechanisms, it makes it even more likely that the RRSP should be transferable to other industries. However, there might be a challenge for cross-industry transferability, as there are certain aspects of the aerospace industry that is not necessarily reproducible elsewhere.

Especially one aspect might cause complications. This is the excessive requirements to both safety and quality present in the aerospace industry, that prevents the RRSP from fostering certain opportunistic behavior, discussed using the reduced incentives for quality performance. In previous case studies, this has been pointed out as a weakness of the RRSP, and it was also discovered in this study that parties in RRSP is punished for providing more than the bare minimum. The excessive focus on regulations in the aerospace industry prevents this to a certain extent, however, this is likely to impair the degree of transferability.

Based on this study, it appears that the market situation of the involved parties is the most important aspect of RRSP-transferability, and more specifically the power-dependence between the involved parties. It should also be noted that it is beneficial to have a certain preexisting mutual trust. The ideal situation appears to be very expensive projects, where there is a mutual dependence between the parties. I.e. the supplier is heavily dependent on the buyer, whereas the buyer has few options and prefers a supplier, yet the buyer is reluctant to acknowledge the supplier as a long-term partner (more than the 3-5 years in traditional LTAs).

4.3.2 The Case Study of MacGregor AS – Is RRSP a Viable Option?

Based on interviews with MacGregor, it is evident that there are two major challenges in the partnerships. The first challenge is that MacGregor experiences what they feel is an unfair

distribution of risk, where their customer is moving the risk down their supply chain, resulting in tighter profit margins and a responsibility that is not reflected in the provided compensation.

The second issue is that some suppliers are selling components in the aftermarket without going through the sales channels of MacGregor. This results in both MacGregor losing potential revenue, but it also impairs MacGregor's ability to retrieve data on the usage and quality of the components for future improvement purposes.

Apart from this, there has also been expressed desire from MacGregor for the suppliers to participate in the funding of new products, as well as for MacGregor to get closer collaborations with the suppliers. From the interviews it was stated "instead of fighting with the suppliers, we want to pull them closer". This indicates that there is some conflict with the suppliers, and the aftermarket situation is an example of such a conflict. This conflict is arguably an agency problem, where the strategic intentions of the principal and agent are diverging. It was argued that it might be challenging to assess the transferability of the RRSP if the intentions are to solve agency problems. This is because the RRSP was originally initiated to solve transaction cost problems such as the make or buy decision, and even though the RRSP are in line with several of the propositions in the agency theory, there are some issues with the partnerships from the perspective of customer satisfaction due to the output measures.

When compared to the model, it is necessary to first satisfy the dimension consisting of the requirements. The first and fourth factor considered the financial magnitude of the contract, as well as the financial capability of the suppliers. For the sake of the discussion, it is assumed that these are fulfilled, and since it is a binary requirement that depends on the business case, it is not likely to become anything else than vague assumptions. It is necessary for MacGregor to evaluate if these requirements are met when and if the RRSP becomes a reality.

The second and third dimensions cover MacGregor's trust in the supplier's abilities regarding the product development and supply chain coordination, as well as the supplier's trust in the product. These dimensions will to a certain extent be speculative as well, and MacGregor needs to ensure this trust is present. However, the dimension regarding MacGregor's trust towards the suppliers is yet an interesting discussion. There are some conflicts present in the relationships, however, it is apparent that there still is a presence of trust between the parties. It appears that MacGregor are

hesitant to enforcing contractual demands, to provide the suppliers with a chance to redeem errors. The suppliers are also willing to provide extra service for MacGregor in times of need, such as providing additional production slots and moving them forward in the queue. It was stated that this was done to conserve the long-term relations. Yet, the agreements are framework agreements with a horizon of 3-5 years, meaning the suppliers are not guaranteed work for more than the immediate future. The behavior of the suppliers is an indication that they are willing to work in the interest of their principal, in exchange for the long-term opportunities. This provides reason to believe that the RRSP might be a viable option for solving agency problems in MacGregor's supply chain.

The benefits MacGregor want to receive can all be connected to the prerequisites concerning the market situation and product characteristics in the aerospace industry. There is no reason to believe that the products in MacGregor's portfolio will have any problems achieving the absolute requirements of the RRSP, however, the discussion whether the benefits can be realized is interesting.

The market situation is similar, as there in both cases appear to be a significant buyer power in the relationships. However, in MacGregor's case it appears that they are unable to maintain this power throughout the lifecycle of the products. The supplier's willingness to work for long-term opportunities suggests that they to certain extent are dependent on MacGregor, however, their behavior in the aftermarket suggests that they are able to survive without working with MacGregor.

This behavior in the aftermarket appears to be a symptom of an underlying agency problem, which is that the suppliers want to work with MacGregor, but the uncertainty generated by short-term focus on MacGregor's framework agreements results in the suppliers having to maximize short-term profits in case they are not preferred in the future. This situation was also identified in company B, as they were able to sell directly to the end-customer in the aftermarket, without going through their immediate customer. However, company B preferred the RRSP, as it provided more predictability and less logistics from the supplier. If MacGregor is willing to reduce their potential profit margins in the aftermarket by sharing with their suppliers, it is plausible that they will be able to retake their shares in the aftermarket.

However, despite the RRSP is likely to solve some agency problems, it is not designed for doing so. It might be that using the RRSP to solve the agency problems in MacGregor's supplier

relationships could cause another agency problem to appear. From the interviews, it was apparent that MacGregor AS also have a significant customer focus, as they are aware that they, as a supplier, is in a market with tough competition and high degree of buyer power. This results in them having to think about their long-term relations with the customers as well. Customer satisfaction should therefore have a significant focus, and not just the commercial success of the product.

It is expected that an excessive customer focus is not necessarily required in the aerospace industry, as the oligopoly combined with a demand for airplanes that is much higher than the supply will ensure that airplane producers maintain a strong market position, regardless of their focus on customer satisfaction. Combined with the strict requirements to certification, it is likely that the RRSP's sole focus on commercial success is sufficient when considering potential long-term implications with customers.

For MacGregor, however, there appears to be an absence of external legislation, as the minimum requirements to quality is decided by the customer. Because of this it might turn out that RRSP is insufficient, as it does not reward excessive effort, but rather only the minimum effort in order to generate extra revenue from replacing broken parts. This means that the RRSP as it is used in the aerospace industry should not be directly adopted, but it needs to be adapted with other performance-based incentives of the end product, to ensure that customer satisfaction is maintained.

Because the reward sharing aspect is based on the principle of percentage ownership, it would be necessary to do some alterations to the RRSP contract. There are two potential solutions to this: The first solution would be for MacGregor to re-negotiate with their customers to receive performance-based contracts, where commercial success is directly linked to the performance of the assembly. This would mean that the suppliers are rewarded based on whether they deliver quality for the customer, rather than producing components that are intended to serve the bare minimum. The second solution could be to give their suppliers an initial percentage ownership, but this percentage could increase if certain performance parameters are achieved. This would ensure that the partnerships still maintain the principle of fair distribution of risk and reward, but the suppliers are rewarded for delivering extra performance.

4.3.3 A Potential New Strategy

During one of the interviews, it was uncovered an interesting situation. It appears that MacGregor AS has been approached by one of their customers, who wanted them to invest or participate in the development of a new ship. This is interesting, as MacGregor are considering using the RRSP with its suppliers, however, there are indications that the customers of MacGregor might be favorable candidates for RRSPs as well. When considering the two main issues identified earlier, the uneven distribution of risk and opportunistic behavior in the aftermarket, it is evident that the suppliers are not the root cause of the issues. They are acting opportunistically in a situation that has been created by the customers of MacGregor. The customers are the ones pushing the risk to their suppliers, and at the same time purchasing the components from MacGregor's suppliers without going through MacGregor.

The customers of MacGregor are immediately fulfilling several of the requirements for using the RRSP, and it would be interesting to investigate whether the RRSP could be a favorable alternative for both parties on MacGregor's customer side. This is because the customer is requesting aid to acquire investments and new technology, which is exactly what the producers in the aerospace industry originally intended. The customers of MacGregor are also experiencing the same buyer-power that is present in the aerospace industry, and it is apparent that MacGregor would find the supplier benefits desirable as well, as this would provide them with long-term business opportunities.

However, apart from the long-term opportunities, it might be possible that using the RRSP with MacGregor's customer is a better solution to their challenges than initiating the RRSPs with suppliers. First, the customers are displaying several of the same strategic intentions as the producers in the aerospace division, meaning the RRSP will be solving the problems it was initially designed for. Second, the problem with an unfair distribution of risk would be eliminated, as there would be an agreement between MacGregor and its customer guaranteeing that both parties are rewarded according to the risk they assumed. Third, the issue with aftermarket hijacking from MacGregor's suppliers would be eliminated, because (1) MacGregor would be responsible for this assembly throughout the lifecycle, supplying the components, and (2) the customer would no longer save anything from buying from a supplier of MacGregor, but would receive the components at the same price as MacGregor does.

This should ensure that MacGregor receives the same profit margins as their customers, at the cost of them assuming a higher commercial risk. The customer would receive the benefits of reduced commercial risk, reduced cost of innovation, and increased transparency with MacGregor. Adopting RRSPs with their customer would also make it easier to implement RRSPs further down the supply chain, as the payment structure could simply be extended once sub-assemblies are defined, without thinking about how the incentives are affecting the end customer.

The challenge here is that the RRSP is traditionally initiated by the customers and convincing the customer to initiate this might be more difficult than convincing the suppliers, as the bargaining power appears to be located with the buyers. However, it is likely that the customer is more approachable as they are seeking partners for funding, and a sales argument is that this is a proven partnership in the aerospace industry for acquiring funding, increasing the rate of technological innovation, and a fair distribution of risk where the suppliers are working in the interest of the customers commercial success.

5 Conclusion

This study discussed three research questions to evaluate the degree of transferability of the RRSP as it has been used in the aerospace industry. Due to the two research gaps, the result of this study will have several implications for both theory and practice. Most notably where earlier studies have disregarded the supplier perspective on RRSP, this study has shed some light on the possibilities for all involved parties in the RRSP constellations through the benefits of the partnership and the associated disadvantages. The result of the study was a model describing the absolute requirements for using the RRSP, as well as the contextual prerequisites that explain the favorability of the partnership outcome.

Among the implications this study has for the theory it has been discovered that the RRSP should realistically be directly transferable to other industries, given that certain criteria are fulfilled. These criteria are the requirements that consider the financial traits of both the contract and supplier organization, as well as the preexisting trust levels. On the other hand, it is apparent that the benefits are dependent of the market- and competitive situation. It is therefore clear that characteristics of potential RRSP-products and suppliers decide if the RRSP is possible, whereas the competitive situation decides the favorability of the RRSP. It is therefore proposed that RRSP is best used in expensive projects/ products where there is a certain level of preexisting trust, and the buyer/supplier is very dependent on each other.

A limiting factor, however, is that the RRSP is not ideal for unregulated products where there is a higher desire for quality, as both theory and practice prove the RRSP is disincentivizing quality. The discussion regarding the RRSP incentives also concluded that the RRSP is designed for make-or-buy decisions, and not ideal for solving agency problems through goal congruence, unless the only goal of the buyer is commercial success. This is not likely to always be the case, however, the market situation in the aerospace industry allows for such strategic intentions.

When considering implications for practice, this was illustrated through the case study of MacGregor AS. The challenges were identified as agency problems, and it is uncertain whether the RRSP would be an ideal solution as MacGregor desire reduced agency problems, recovery of aftermarket profits and long-term relations with their customers. A proposition for how MacGregor could design their RRSP contracts to conserve these benefits was proposed. The first proposal is

to change the payment structure received from the customer to something that rewards performance to both ensure a fair distribution of risk, as well as conserving the customer focus and reclaiming shares at the aftermarket. The other suggestion was to present their suppliers with performance-based clauses, that both ensured a minimum quality, as well as providing them with a higher ownership percentage if they provide the customer with better components.

It is expected that the suppliers will find this favorable as well, since the competitive situation in the aerospace industry was identified as the main driver for wanting to participate in the RRSPs. This situation was very similar to the conditions among MacGregor's suppliers, making RRSP adaptation plausible.

However, a third proposition was made, as the challenges MacGregor is facing can be traced back to their customers. If MacGregor is able to shift focus from using RRSPs for better supplier-relations, and instead assess the opportunity for using the RRSP with their customers, there is a higher likelihood that MacGregor will realize their strategic intentions. This is both because the customers are showing strategic intentions that are in line with the intentions shown from the original producers in the aerospace industry, and because an RRSP with the customers should in theory solve the problems at the root by making it unrewarding for the customer to continue the current practice, while still providing them with other benefits.

Future studies should aim at statistical verification of the model and investigate how different business models could be designed for the RRSP to maximize the effect of the different benefits.

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7 Appendix A – Literature Review of RRSP

AUTHORS	THEME	METHOD	DESCRIPTION
ARMELLINI, KAMINSKI & BEAUDRY, 2014	Study of Brazilian aerospace industry	Survey	Investigating how the different organizations in the Brazilian aerospace industry is using open innovation.
BUZACOTT & PENG, 2012	Contract design for Risk and reward Sharing Partnerships in manufacturing	Literature study/ simulation	Discussing the partnerships in aerospace industry, and the structure of their contracts.
CAMUFFO, FURLAN, & RETTORE, 2007	Risk sharing in Italy	Case study	Risk sharing in Italian AC-manufacturers, related to agency theory.
DENNING, 2013	Case study on the Boeing 787 Dreamliner	Case study	Investigating what went wrong with the Dreamliner, which was a project using the RRSP.
FIGUEIREDO, SILVEIRA & SBRAGA, 2008	Risk and reward sharing partnerships in Embraer	Case study	Describes Embraer's use of RRSP, and what benefits it provided.

GIANNOCCARO & PONTRANDOLFO, 2004	Revenue sharing contracts in supply chains	Simulation	Investigating revenue sharing contracts in a three-stage supply chain.
GOEHLIECH, 2008	Market analysis of aerospace industry	Market analysis	Provides an analysis of the aerospace industry from an economic perspective.
JORDAN & LOWE, 2004	Knowledge sharing in aerospace partnerships	Literature study	Discuss how the market situation fosters hostile partnerships and distrust.
KEMP & STEPHEN, 1999	Risk and Reward Sharing in the oil industry	Simulation	Monte Carlo simulation of risk/reward sharing in the oil industry. Discuss the contractors' willingness to accept increased risks.
ROUHANI, GEDDES, DO, GAO, & BEHESHTIAN, 2018	Risk and reward sharing in public-private partnerships	Case study	Discuss what sorts of risks should be outsourced in PPP construction partnerships.

ROSE-ANDERSSEN, BALDWIN, RIDGWAY, ALLEN, & VARGA, 2008	Innovation in the aerospace industry	Literature study/ case studies	How the RRSP is linked to increased innovation.
TANG & ZIMMERMAN, 2009	Case study of the Boeing 787 Dreamliner project	Case study	Case study on the supply chain of the Dreamliner (pre-launch).
TSE, ZHANG, & JIA, 2018	Effects on risk and reward sharing on quality	Literature study/ survey	Discuss the impact of RRSA on quality.
WAGNER & BAUR, 2015	RRSP in the aerospace industry	Case study	Describing the initial RRSP model, and proposing improvements based on experiences.

8 Appendix B – Findings from Company A

Product	<ul style="list-style-type: none"> - Producing components for airplane engines. - Components costs 1 – 10 % of total assembly. - Very expensive (1 % ownership is typically an investment of 20 mUSD). - Components are tailored to each new assembly. - High volume (2.000 – 24.000 depending on product). - Components are changed either after a certain usage or when they break. - Long life expectancy (production and service periods are normally 40 – 50 years). - Significantly higher profit-margins in the service period (engines are sold at high discount). - Long pay-back period for the engines (positive cashflow after 15 years – revenue begins after 7-8 years). - Components needs to be certified in order to be used in assembly.
Market situation	<ul style="list-style-type: none"> - Few producers (4 producers of engines). - A lot of competing suppliers can produce the same components. - Few opportunities for new projects because these normally appear when a new airplane, or a new version of an existing engine, is being developed (normally a new RRSP-project appear every 7 – 8 years).
Motivation	<ul style="list-style-type: none"> - Started using this in the mid-80's. - They were asked by a customer. - The RRSP ensures long-term cash flows (they do not have to compete for contract renewal every 4-5 years). - They can take part in the service market with higher profit margins. - They will receive a “first refusal” if new versions of the engine are developed.

	<ul style="list-style-type: none"> - The supplier has significantly higher profit margins than the normal supplier in this industry due to the use of RRSPs, according to the respondent (25 – 30 %). - Company A is not producing components for any other industry, meaning they are very dependent on the engine producers.
<p>Business model</p>	<ul style="list-style-type: none"> - RRSP is initiated based on existing relations. - The supplier is asked if they are interested in participating and be presented with ideas and designs. - The supplier will pay an entry fee and cover design and production costs. - The producer and supplier decide the percentage contribution of these components. - Design is conducted in collaboration, due to a lot of interfaces. - After design is locked-in and approved, it is nearly impossible to change. - Normally 4-5 partners each time. - The partners are responsible for production and covering the production costs. - Components are delivered to producer, which handle the service period. - The finances are regulated, meaning that if you own 1 % of the product, then you will always receive 1 % of the revenue from lifetime cashflows. - The RRSP contracts are much more complex than the traditional contracts. - The partners share risks as well, meaning that if the product does not live up to the expectations in the business case, or if there is a warranty situation, then the partners will share this burden in accordance with their percentage share.

Other findings	<ul style="list-style-type: none">- The RRSP requires solid financial capabilities, as the entry and development fees are very high.- The payback periods are quite long (15 years before positive cashflow).- It is very difficult for suppliers to enter service market without the engine producer. This is because of the strict regulations regarding use of non-original parts and service.- The only “unsuccessful” RRSP was when company A delivered too good quality. This resulted in the components not needing change, and hence lower service income.
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9 Appendix C – Findings from Company B

Characteristics	<ul style="list-style-type: none"> - The company has several divisions across industries, where the aerospace division is the only using the RRSP. - They are using the RRSP on a wide range of products. - These products include both high- and low-tech equipment, as well as varying complexity (“design to order” and “build to print”) - Are normally operating with short-term agreements (STA) or long-term agreements (LTA) with horizon of up to 5 years. - The competition in the market is asymmetrical (few customers and tough competitors) - The customer’s product is very expensive (do not have the necessary funding for product development alone). - Long lifetime of products (25 – 30 years). - Company B’s (aerospace division) competitive advantage according to themselves: Technology, quality and ability to hit pricing levels.
Motivation	<ul style="list-style-type: none"> - Asked by their customer, with long-standing relations. - Potentially higher returns. - Longer business horizon than in normal long-term agreements. - They are generally seeking long-term opportunities. - The first time they used the RRSP required a lot of internal preparations and selling. buyer assisted in developing internal business case that compared the expected revenue streams of RRSP vs. non-RRSP.
Business model	<ul style="list-style-type: none"> - Invited to participate based on merit. - They are supplying a product, manpower and/or up-front investments in the RRSPs. - The decision to enter an RRSP is conducted on a case to case basis.

	<ul style="list-style-type: none"> - No fixed business model, as they have both RRSPs with and without an aftermarket. - Aftermarket products see a profit at a later point in time (can be sold at a loss). - Non-aftermarket product normally makes a profit at the time of sale. - The end customer can also be charged a “dollar per flying hour”, that covers the service of the aircrafts.
<p>Other findings</p>	<ul style="list-style-type: none"> - The requirement for considering an RRSP is that the financial magnitude of the deal is high enough, because the RRSP is very expensive and time consuming to both initiate and follow up. - Customer wants everyone working towards the same goal (the success of the product), as well as bringing the product faster to market in the most efficient way. - Customers are always looking at price and cost, and through the RRSP they get a better understanding of the cost levels of their suppliers. This increases the customer’s trust in that the price is fair. - Company B is aware that they are paying for the buyer’s R&D. - Company B is actively pursuing long-term opportunities and cannot afford to be in conflict with customers. - When asked if it would be necessary with such a partnership if the buyer was able to cover costs, they pointed to the uncertainty in demand, and that a product is not necessarily successful. - They are very pleased with the RRSPs, and have not had an unsuccessful RRSP, however, there are times when revenue streams have occurred later than expected. - Even though it is more profitable to sell aftermarket-products directly to customers, they prefer long-term revenues in the RRSP. The RRSP also ensure that they do not have to deal with the

	<p>logistics of selling to multiple customers as the buyer coordinates this.</p> <ul style="list-style-type: none">- It is very important that the supplier have belief in the product, as it is a very big investment. This belief comes from the supplier's knowledge of both the product and market.- When asked why only the aerospace division is using the RRSP, the answer was that it is because the customer is the one who takes the initiative.
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10 Appendix D – Article Submitted to EPPM19, based on this Study

Adaptation of Risk Sharing Partnerships (RSP) to New Industries

Abstract

The aerospace industry has since the 1990s used a partnership model called Risk Sharing Partnerships (RSP) to handle certain challenges faced in the development of new aircrafts. The RSP model allows the client to include key suppliers in the development of a new product, and hence sharing the burden of investment, risk mitigation, as well as the future sales income. This makes it easier to acquire funding for the development of new products and technologies, in addition to accelerating the development process by including key competencies earlier (Buzacott, 2012). RSP have raised interest in other industries, which calls for increased knowledge of contingency factors of the RSP, as well as suppliers' perspective on RSP as a partnership model. Both are regarded important if cross-industry learning is to be promoted. By using a literature review of existing studies on RSP, combined with a case study of two aerospace suppliers, this study investigates the contingency factors of the RSP as a foundation for cross-industry transfer of knowledge, and proposes a model to assist cross-industry adaptation in project-based industries. We propose that there are three critical contingency dimensions for RSP-implementation, based on both financial and relational factors.

Keywords: Aerospace industry, partnerships, reward sharing, risk sharing, risk sharing partnerships

Introduction

The level of investments and general economic activity in the Norwegian offshore sector has since the 2014 drop in oil prices been decreasing, and forecasting are not suggesting any increase soon (Hovland, 2019). For the sector to stimulate investments and innovation, as well as to improve internal processes, there is a need for change. The sector therefore looks to the aerospace industry for inspiration, as parties in this industry have with success implemented what is known as Risk Sharing Partnerships (Figueiredo, 2008). The aerospace industry has since the 1990s used RSP contracts to handle certain challenges faced in the development of new aircrafts. The fundamental concept of the RSP is that the original equipment manufacturer (OEM)/ aircraft producer outsources a complete sub-assembly to a partner. The partner will be responsible for both design, production and service costs, and will in return be rewarded with a percentage share of all the future revenue of the planes, corresponding to the value of the sub-assembly (Figueiredo, 2008).

The apparent success of this partnership-model in the aerospace industry has caused organizations in other industries to consider whether the RSP could be a viable option in their industries. However, a literature review shows limited research on the RSP across other industries with similar conditional contexts. In addition, most studies on RSP seem to adopt a buyer perspective, whereas the suppliers' perspective has not yet received much attention. Both are regarded important if cross-industry learning is to be promoted.

This study therefore aims at investigating the contingency factors of RSP, including a supplier perspective, to enhance knowledge and understanding of why RSP may be a viable option

within a specific industry environment, and under which circumstances these benefits may apply when the product environment is changed. The article elaborates extant theory with insight received from interviews with two suppliers in the airplane industry. A framework is presented describing external and internal factors favoring a possible use of RSP as a contractual model.

Risk Sharing Partnerships

The Risk Sharing Partnerships (RSP) as a contractual model originates in the aerospace industry (Figueiredo, 2008). It was adopted by some manufacturers in the mid-1990s as a response to challenges both in the market and supply chains. Figueiredo (2008) explains that the RSP was inspired by strategic partnerships in general and developed to reduce investments and dependence on loans for product development from the client side. To reduce investments, the aircraft manufacturers decided to let certain suppliers contribute with funding, with the promise of a future revenue share from the product series in question. The result was reduced commercial risk, as the suppliers paid to be part of the development to ensure long term profits. In addition to the need for capital, the partnership model was adopted to consolidate relationships between international suppliers and the OEM (Armellini, 2014; Buzacott, 2012).

The two major control mechanisms in RSP are risk and reward sharing (Tse, 2018). The risk sharing mechanism focuses on aligning the responsibilities of the different partners. This means that the parties are all responsible for a certain level of risk and participation in mitigation of risk, rather than the client being the sole risk taker in the contract. The reward sharing on the other hand is a behavioral mechanism which aims at creating goal congruence with the involved parties. By sharing the future profits of the product, it is expected that the suppliers will act in favor of the project, and not just themselves. Hence the main criteria for an RSP is that there is a participative sharing of risks, and that the parties involved have the rights to share future sales income from the products (Figueiredo, 2008).

An RSP contract is different from traditional collaborative contracts where the supplier delivers a product or service for an initial price that covers both their costs and profit margin. In this traditional setting the client's further refinement of the product allows for a higher price to their customer, which accommodates the cost of goods sold from the supplier, cost of further value-added processes of the product, as well as a profit margin for the client. In the RSP contract, however, the supplier and client cooperate in the design, production and life cycle support of a single product (Wagner, 2015). By doing so, the supplier will collaborate with the client by contributing either by funding, expertise or resources that is necessary for the development of the product. In return, the supplier is considered a co-owner of the product, and are entitled to a share of the future revenue. The characteristics of an RSP, however, is that this arrangement is done through an incentivized contractual model rather than investments in a joint venture arrangement.

In the aerospace industry, initiating RSPs is done on a plane to plane basis, meaning that for every new airplane in a product-series sold, the risk sharing partners will receive an additional compensation for the initial risk undertaken (Buzacott, 2012). This is illustrated in figure 1 below.

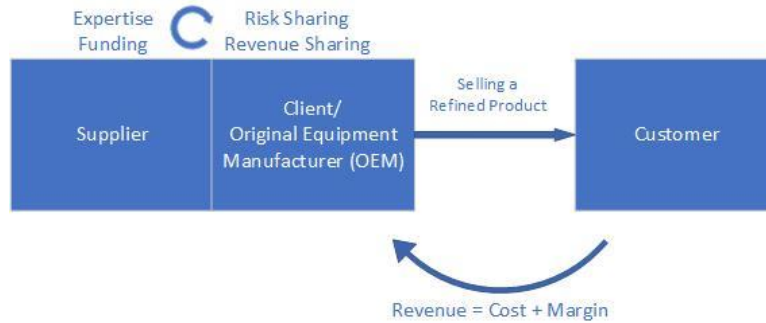


Figure 1. Collaboration in risk sharing partnerships.

Through a literature review, two main gaps in knowledge of RSP emerged. The first is lack of knowledge concerning the contingency factors of RSP, i.e. are there specific circumstances that contribute to make RSP a viable option in the aerospace industry? The second gap concerns the lack of studies on how RSP is perceived by the supplier side of the collaboration. Both knowledge gaps are of interest when investigating the rigor of the model and adaptation possibilities to other industries. Limited understanding of why it works in one industry poses the risk of adopting the model to a new business context by “shooting in the dark”. This study, therefore, aims to uncover specific institutional factors from both the perspective of the OEM and supplier that are prevalent in RSP relationships and their business context, by posing the following research question:

What are the contingency factors of the Risk Sharing Partnerships (RSP), and are these transferable to new industries?

To answer this question, a model will be developed through a case study of the aerospace industry, using a mix of previous case studies on the original equipment manufacturers (OEM) and interviews with suppliers in these RSPs. Data are gathered from a literature review on OEMs using RSP, in addition to primary data from interviews with two supplier organizations within the aerospace industry. These organizations and respondents include:

- Company A: Tier 1 supplier with significant experience with RSP. Produces a wide portfolio of aerospace systems, including hydraulic and flight control system.
- Company B: Tier 2 supplier with significant experience with RSP. Produces vital components used in the aircraft engines.

Characteristics of the aerospace equipment industry

In order to understand the contingency factors of the RSP, it is necessary to understand the market context in which the partnership model originated. The focus of this chapter will mainly be on the aviation sector of the aerospace industry, and the production of airplanes, which is where the RSP is predominantly used. It is estimated that the production of airplanes account for close to 80 % of the total revenue in the aerospace industry (Goehlich, 2008). This number rises to 90 % when including the production of the weapons systems for military purposes. It is estimated that military contracts accounts for nearly 50 % of the revenue from airplanes. According to Goehlich (2008), the forecasting of demand for airplanes in 2008 was expected to increase drastically over the next decades. Already in 2008, demand was estimated to be 1000 airplanes per year, which by then was above the current production capabilities.

The market structure is what could be considered an oligopoly, with 6 major manufacturers in the aerospace industry (Jordan, 2007). Out of these 6, Boeing and Airbus are the clearly dominant producers (Goehlich, 2008). According to Jordan (2007) no companies have all the necessary specialists to develop and produce airplanes on its own. Moreover, the suppliers often have a diversified portfolio and deliver solutions to other industries. This often makes the manufacturers more dependent on the suppliers, than the suppliers are on the manufacturers (Goehlich, 2008).

Due to the military contracts, as well as the excessive requirements that focus heavily on safety, there is very limited number of suppliers that can contribute to the production of airplanes (Jordan, 2007). As a result, the different suppliers are often working as partners and competitors at the same time on different projects. This situation results in a situation that nurtures little trust and communication, as the suppliers' main reason for gaining competitive advantage relies upon the specific knowledge they possess.

The political factor, where governments require manufacturers to include national suppliers on the product results in large, complex supply chains, with several partners on an international scene. The partnerships in the aerospace industry has become known as "shotgun weddings", where the choice of supplier is determined by governmental pressure and lack of competition, rather than being initiated at their own choosing (Jordan, 2007).

The products are also highly complex and expensive. According to Nystrom (2005), there are several similarities between the aerospace and automobile industry, which both are make-to-order (MTO) industries. An MTO-industry is where a product portfolio is developed, and each individual sale is later tailored to the customer's need. This means that the production of the airplane does not start until after the order is placed by a customer, and the industry is therefore very focused on reducing the lead time of production.

However, unlike the automobile industry, there is a significantly greater extent of complexity (Goehlich, 2008). Whereas a car usually contains 7000 components, the airplanes contains up to 6 million. When also considering that the operating conditions for the products are tougher, it means that even a moderate development in technology for the aerospace industry requires large investments (Esposito, 2004). This has resulted in high fixed costs of the airplanes (R&D), which leads to lower profit margins and very long payback periods for the products (Goehlich, 2008). It also results in a very high financial risk for the individual manufacturer. The costs are further increased due to high bureaucracy levels, numerous design changes, extended schedules due to delays, and poor, belated communication between the partners (Goehlich, 2008).

As a result, the industry has become known for excessive outsourcing of large sub-assemblies. This results in reduced lead time in the production of airplanes, as there are several suppliers delivering complete sections of the airplanes directly to the assembly manufacturer. The use of larger sub-assemblies, where the different responsible suppliers coordinates sub-contractors results in a reduced need for inventory management and interdependencies of the other sub-assemblies of the airplanes. This would have not been the case with smaller sub-assemblies, as this would have required a more thorough scheduling to avoid further delays (Goehlich, 2008).

However, this complexity and modulation results in a higher performance ambiguity, as it is difficult to assess performance beyond commercial success. Commercial success is also difficult to measure, as the manufacturers normally have only one or two extremely successful products that secures portfolio profits. Most of the production lines are not financially profitable; however, they are necessary to ensure further competitiveness. This is because the airlines prefer to invest

in a product family, rather than buying airplanes from different manufacturers (Goehlich, 2008), presumably from an operations and maintenance cost perspective.

RSP as a Contract and Business Model

The most common examples of how the RSP has been implemented are drawn from Boeing and Embraer. Both companies have adopted this form of partnering by creating a ranked network of suppliers. Initially, they divide the aircraft into several sub-assemblies, and gives each risk sharing partner the responsibility of a certain assembly. Each of the sub-assembly owners can be considered a risk sharing partner. The supply chain network was hence divided into 3 tiers, which could be described the following way (Denning, 2013; Figueiredo, 2008).

- The first tier included the risk sharing partners. This was the companies that were included in the funding and development of the new aircrafts, and hence included in the future reward sharing. They are responsible for different sub-assemblies of the aircrafts and oversee coordinating deliveries from the different tier 2 and 3 suppliers.
- The second tier consisted of parties supplying components, systems or services, but not being a part of the R&D team. These companies were presented with a set of technical specifications and asked to develop a solution for the different sub-assemblies. The tier 2 suppliers report directly to the tier 1 partners.
- The third tier consisted of suppliers providing less complex and less expensive components. These were not presented with specifications, but rather with materials and blueprints. This tier supplied manpower in the production of less critical components. The tier 3 suppliers report directly to the tier 1 partners.

It is worth noting that the tier 1 suppliers are the risk sharing partners, which are responsible for coordinating the tier 2 and 3 suppliers of their own sub-assembly. In some cases, the tier 2 suppliers have been provided with RSP contracts as well, meaning they own a certain percentage of the sub-assembly, and is rewarded every time that sub-assembly is included in a sold airplane.

The result of implementing RSPs was positive, when considering the intentions of the two manufacturers (Buzacott, 2012; Figueiredo, 2008). The RSP did also provide additional benefits beyond the eased access to funding and supplier consolidation. The study on Boeing suggests that the RSP was shown to accelerate the development process, as a result of earlier involvement of key competencies (Buzacott, 2012). The RSP has also been shown to address agency problems, such as opportunism from the suppliers, if implemented correctly (Tse, 2018).

Among the financial benefits it has also proved to be favorable in situations with high uncertainty in demand. Buzacott (2012) explains how the RSP helped the client by reducing the consequence of low sales figures, as the losses are distributed among the participating parties. It is hence reasonable to believe that the lower financial risk and increased involvement would be beneficial with regards to innovation and technological development.

Criticism of RSP

There exists little criticism on the RSP within existing literature both as a concept but also from a methodological perspective. So far, most studies on RSP use case study as a methodology. Hence there are few quantifiable results that have tested the ability to generalize the findings. Additionally, the RSP-studies have to a very limited extent covered the perspective of the suppliers, and since there are more partners than OEMs in an RSP model, existing research findings on RSP fail to include most of the involved parties in an RSP constellation.

Some case studies indirectly criticize the RSP as a concept. One of these are studies conducted on the development of the Boeing 787 Dreamliner, which used the RSP approach (Tang, 2009). The Dreamliner is an example of product suffering from significant delays and post-launch issues. The case study conducted by Denning (2013) points to several flaws that may arise when using the RSP.

Denning criticized Boeing for mainly five (5) different aspects of the partnership model, resulting in unnecessary risks. These were the risks associated with outsourcing, innovation, coordination, communication and tiered supply chains. The Dreamliner project outsourced more than twice as much as usual, as well as using unproven technology in an unprecedented scale. When combined with Boeing's hands-off attitude towards coordination, aiming for complete partner autonomy and no on-site support, it was probably not surprising the events unfolded as they did.

From the RSP perspective one contractual risk on the Dreamliner project was more interesting; namely the risks of tiered outsourcing. This is the business model used by Boeing for RSPs. The critique was that Boeing used 50 partners, meaning the Dreamliner was split into 50 sub-assemblies, resulting in an insufficient screening. Some of the partners lacked the necessary knowledge regarding both the technical design, but also the experience in supply chain coordination, resulting in delays and technical issues.

The flaws presented in the Dreamliner case appear to be preventable, as several of these risks could be blamed on too ambitious use of the RSP, combined with poor coordination and monitoring. The case study could hence be considered a recommendation for certain "best practices" in the future. Wagner (2015) supports this argument by claiming that the challenges with the RSP so far is mainly due to missing capability or competence of either buyer or supplier.

Another critique of the RSP model is the lack of incentives provided to the partners for finishing on time. Tang (2009) discovered that the lack of incentives for meeting deadlines, resulted in massive delays, and millions of dollars of penalties that had to be paid to the customers.

The Benefits of RSP

During the literature review and case study, the benefits for both the supplier and OEM was documented. This is because when organizations consider adopting a new partnership model, then it is ultimately in order to receive the benefits that this model offers.

For the RSP, these can be separated into benefits for the OEM, and benefits for the suppliers. What was discovered is that some of the benefits for one party is considered a disadvantage for the other party. One example of this is the potential for higher revenues for suppliers, which occurs due to the new payment structure where the suppliers' return is dependent on the sales price of the end product, and not a pre-negotiated rate per component. This increase in potential for the supplier will likewise be a reduced potential for the OEM but will be compensated through other benefits. The following table 1 summarize the key benefits and disadvantages with the RSP found in the study.

Table 1. Benefits and disadvantages of using the RSPs

	OEM	Supplier
Benefits	<ul style="list-style-type: none"> • Easier access to funding. • Reduced commercial risk. • Fewer suppliers, with greater responsibility. • Reduced lead times. • Closer relations with suppliers. • Increased SC transparency. • Common goal (commercial success of product) 	<ul style="list-style-type: none"> • Long-term, predictable revenue streams. • Closer relations with OEM (future projects). • Potentially higher rewards. • Direct access to the spare part market (life-cycle revenues).
Disadvantages	<ul style="list-style-type: none"> • Reduced revenue potential. • Reduced incentives for quality performance. 	<ul style="list-style-type: none"> • Longer payback period. • Locking up capital. • Higher commercial risk

From the OEM’s perspective, the implementation of RSP is a consideration of giving up partial ownership of the product, in order to receive other benefits. These benefits range from reduced dependency on loans through supplier funding, a reduced commercial risk as the losses are shared when product revenue is lower than necessary.

According to Tse (2018) risk and reward sharing used together may have a negative effect on quality performance. Tse (2018) assumed that the reason for this was that the risk sharing aspect of the contracts constitute an accepted “bottom line” for quality, whereas the reward sharing is promoting increased quality due to the potential long-term benefits for the supplier. Company B described in the interviews that the only bad experiences they had with RSPs, were when the prospects of the business case were not achieved. This was when they produced the components of too high quality, meaning the components did not break down, and the company did not get any aftermarket revenue streams as a result. This suggests that RSP incentives concerned with commercial success might conflict with quality performance. Whereas Tse (2018) proposed the quality reduction as the suppliers’ wish to produce the bare minimum, this finding suggests that the suppliers are “punished” by losing out on future aftermarket sales for delivering high quality components.

The suppliers included in the case study were all satisfied with the RSP, and one company even claimed that it would not be operating with such high profitability without the use of the RSPs. It was also apparent that the RSP offers a significant stability for the firms through the long-term revenue streams, as well as contributing to securing future projects through the positive relations with the OEM.

The Model for Cross-Industry Adaptation

The model developed in this study is based on primary data collected in an ongoing study. This section will discuss the dimensions in the model making the RSP a viable option, before presenting the model at the end. Statements in this section will be based on the interviews with the supplier organizations, unless stated otherwise.

Based on the literature review, it was believed that the contingency factors of the RSP would include the product and market characteristics, motivation for using the RSP, and the business model they used. Hence, the interviews with the suppliers had the focus of investigating how the companies operated when considering these factors. In doing so, it was expected that it

was possible to identify a set of contingency factors that would either be required, or contributing, to realize the benefits that has been experienced in the aerospace industry. After the interviews, however, it was discovered that these dimensions did not sufficiently cover the dimensions of the RSP. These dimensions did contribute to making the RSP viable, however, the dimensions included in the model had to be more general. This is because it was found that the RSP in the aerospace industry is used on all types of products and components, regardless of complexity, unit costs, volume or business models. The companies did not have a framework for whether to use the RSP or a standard Long-Term Agreement (LTA) either, but there were a few recurring factors that affected the usability of the RSP.

When also considering that several of the benefits from the RSP are in line with the theories on transaction costs approach and principal-agent, it is expected that the dimensions should also be influenced by some contributing factors from these theories.

To summarize, there are three dimensions that we consider as the contingency factors of the RSP, which would be required to reproduce these benefits. One regarding quantifiable requirements, one regarding the abstract requirements, and one considering the organizational requirements. These dimensions are proposed to be the following:

- Quantifiable dimension: Financial magnitude of contract.
- Abstract dimension: The level of trust in supplier/ product.
- Organizational dimension: Financial capability of involved parties.

Financial Magnitude of the Contract

The first dimension is the financial magnitude of the partnership. This dimension was originally concerning the product and market characteristics of the partnership; however, it was not possible to define these characteristics other than that the combined financial value of the components in the assembly was very high. This is because the contracts used in the RSP are very complex and expensive to develop and might take up to 1 year to finalize. In addition to this, there is a lot of clauses and contingencies that must be constantly enforced, making it very expensive compared to an LTA. For the RSP to be a viable option, the assembly needs to exceed a certain threshold value to make it worthwhile.

This is very much in accordance with the theories on the transaction cost approach which aims at explaining when an organization should buy a product or service in the market, or if it should produce it in-house (Williamson, 1981). Williamson describes that the contract is used to organize the economic transaction, and that more complex contracts gives rise to increased transaction costs. In order to choose the optimal procurement strategy, it is hence necessary to evaluate the supplier's ability to generate economies of scale, versus the need for relational investments necessary for the transaction to be conducted. The three factors that gives rise to transaction costs are according Williamson (1979) also proposed that uncertainty, frequency of transaction and degree of transaction-specific investments required.

Since the RSP is a very complex form of contracting, there needs to be a presence of high transaction costs for justifying spending this amount of resources on developing and enforcing the RSP. This was also highlighted in the interviews, as company A operated with a threshold value that needed to be reached in order to make it worth creating and enforcing the RSP contracts.

This will in turn also be dependent on other factors that may increase the transaction costs, and that is where the role of the product characteristics discussed earlier fits in. It was initially discussed whether the RSP was only used on assemblies of high complexity, however, it turned out that the cost characteristics was the defining factor. However, the cost can be increased by

drivers such as complexity, size/volume, cost of components or even the ownership of certain technology. Therefore, the first contingency factor in the model is the financial magnitude of the partnership, and the product characteristics will be used as contributing factors.

Trusting the supplier and product

The second dimension considers the behavioral aspects of the RSP that results in a shared desire for commercial success, rather than for suppliers to maximize the profits on a single, short-term transaction. Since the RSP is using the long-term, outcome-based contracts as an incentive to create goal congruence (which is in line with agency theory), it is necessary to discuss the contingency factors for creating goal congruence. This is more challenging than transaction costs, as goal congruence is not a quantifiable measure. However, it was summarized rather well in the interviews by using the word trust. This was a recurring statement, explaining that since this is a partnership that is being used throughout the lifecycle of the product, it is necessary for the involved parties to have the necessary level of trust to commit for such an extended period.

This trust goes both ways, as in an RSP the suppliers are no longer simply supplying a product to a greater assembly, but they are co-owner of the final product. This means that the suppliers must have trust in that the product will be a commercial success. Through the interviews, it was discovered that this trust was generated through the business case and type of business model, but it was also necessary for the supplier to have an in-depth understanding of both the product and market to verify the business case.

Likewise, the OEMs require sufficient trust in the supplier, which is likely to be the reason that both the supplier companies that were interviewed have been recruited based on merit, and not from open competition. This results in the creation of a behavioral contingency factor, which is summarized by the word trust. This will in turn be increased by the contributing factors discussed throughout this section.

To further emphasize the importance of trust in this model, one could only look to the case of the Boeing 787 Dreamliner presented in the theoretical chapter. This product was affected by poor execution from several of the partners, and it was apparent that there had been insufficient effort from Boeing in ensuring that the partners had the required competencies. If the OEM is not able to trust that the supplier is able to contribute to the project, then the RSP is likely to not be providing the benefits, but rather cause additional complications.

Financial Capabilities

The third dimension is discussing the contingency factors, or requirements, that is associated with the individual organization's readiness to use the RSP. Primarily based on the interviews, this is the financial capabilities of both the OEM and supplier. This represents two sides of the same issue, as it describes a situation where the OEM is not able to fund the project development alone, and that the supplier have the necessary financial strength to cover these investments, in addition to postponing the revenue streams.

The financial strength of the supplier is a necessity, as the supplier will not be able to participate in the product development without having the required stability to survive until the profit appears in the future. This is because in a traditional STA or LTA, the revenue is generated once the OEM purchase the component, whereas in the RSP, the supplier will not receive revenue before the OEM has been able to sell the product.

However, the financial capability of the OEM is not necessarily a required factor, but it tends to explain why the OEM chose to implement the RSP in the first place. By using the RSP,

the OEM is essentially giving away parts of its potential future revenue, which is not something one should expect unless the OEM get something in return. This is because they are forced to give away the revenue potential due to missing funds, however, it is also reasonable to believe that the OEM could accept a lower potential revenue to achieve the other benefits as well. Therefore, the financial capability of the supplier is a contingency factor, and the financial capability of the OEM is merely a contributing factor that provides the benefit of reduced interest rates on loans if present.

A Fourth Dimension – Competitive Situation

The fourth aspect is the role of competitive situation. The respondents' companies in this study were both experiencing competition from other suppliers able to deliver similar products or substitutes, meaning they benefit greatly from such close ties with the OEMs. However, in the study of the aerospace industry characteristics, it was described that the OEMs were more dependent on the suppliers than the other way around. Even though these descriptions of the competitive situations are in contrast, it is reasonable to believe that the suppliers are actually more dependent on the OEMs. This is based on the reasoning that there are two major OEMs in the aerospace industry, and even though the suppliers are diversified, the aerospace divisions in these supplier companies will rely heavily on the few projects presented by the OEMs. Hence, it would be interesting in future studies to investigate whether the power relations in the market is a factor contributing to making the RSP more viable, or if especially the suppliers will still find the RSP attractive if they do not need to secure these long-term relationships due to monopolistic tendencies.

The model

From the above discussion we propose the following model in figure 2 to illustrate three dimensions that may make the RSP more attractive for organizations in other project-based industries.

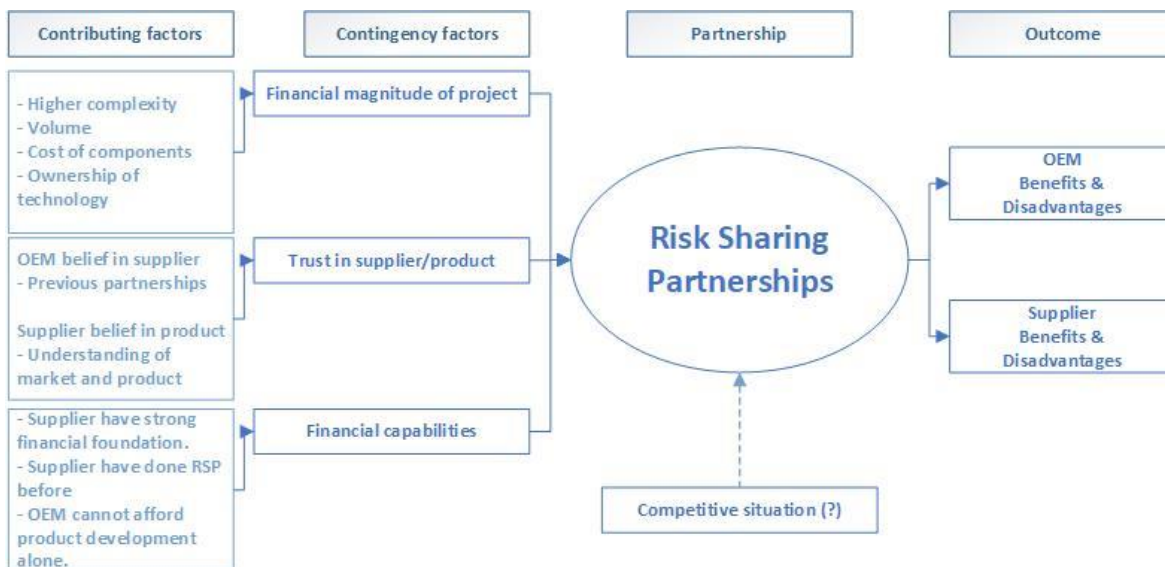


Figure 2. The model describing contingency and contributing factors of the RSP

The proposition is that each of the three dimensions are contingent factors for the transfer of the benefits of RSP experienced by the aerospace industry to other industries. The intention of this model is that it will aid in cross-industry implementation of the RSP by describing in the most general way what factors in the aerospace industry has contributed to realizing these benefits. When applying the model, one should identify whether the existing partnership in the new industry is able to fulfill the requirements established by the contingency factors as a starting point for knowledge transfer.

Conclusion

This paper has presented a literature review and a case study on RSP, its benefits and limitations with an additional focus on including the supplier perspective of this partnership. The aim of the study was to theoretically explore the contingency factors of the RSP, as a contribution of knowledge for cross-industry implementation of the partnership model. Based on this we have presented a model where three contingency factors are identified: (1) financial magnitude of the project, (2) supplier trust and (3) the financial capabilities of mainly the supplier, but also the OEM as a contributing factor. In addition, we indicate a fourth dimension as the competitive situation. Further investigations will be conducted to both investigate and test the model on a larger population of RSP companies and explore how business models could be designed to secure the benefits for in other industries.

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