A Study about the use of Resources to Strengthen the Network Position

A Comparative Case analysis within the Defense industry.

Matilda Immonen
Abstract

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This qualitative research has been performed at Saab Dynamics with the purpose to analyze how resources are used in Saab to improve their processes and increase their market share. The theory used is founded in IMP theory with the implication that companies must move their focus from only considering internal resources into using their network. To analyze the different types resources in the network the 4R model has been used and adopted to two different cases at Saab Dynamics. The first case is about Saab’s procurement of one of its suppliers, ACAB, and the second case is about a Country X’s procurement of the man-portable air-defense system RBS 70 NG. To gather data about the cases interviews has been performed with employees at Saab as well as other stakeholders. The result from these interviews were then analyzed based on the 4Rs, answering the questions:

- What Products are involved in the product development?
- Which Production Facilities are involved in the product development?
- Which Business Units are involved in the product development?
- What Business relationships are involved in the product development?

Once the resources were analyzed and compared to separately, the following question was answered:

- How have resources been combined to expand and strengthen the network?

The result from the research showed that Saab has a great focus on its suppliers and how they should structure the network for the best potential end-result. In the first case, the procurement resulted in factors such as shorter lead-times, smoother processes and better quality products. The second case showed that Business Relationship resources such as trust played a great part in the procurement. To grow a stronger Business Relationship, Saab used a supplier in Country X which in turn also ended up being a part of the creation of a new innovative component.

The end discussion is about the benefits that the procurement of ACAB and weather this could be used as a way for Saab to expand their network while also gaining more control over the Supply Chain. This is something that goes against modern-day literature which often argue that the opposite often is to prefer. In the end there is also a short ethical section with the aim to examine why people chose to work in an industry like Saab Dynamics. To gather the data a few interviews were made with the end result that the respondents believe that the industry is necessary for the protection of Sweden and that it “is a human right to feel safe”.
Preface
This report comprises a Master’s Thesis within Industrial Management and Innovation at Uppsala University. The thesis work was conducted in the procurement unit at Saab Dynamics, a company in the Defense Industry. Being in such a debated industry, was exciting and allowed me to view it from new perspectives and understand it better. The basis for this thesis steamed from my passion to understand the influence suppliers and other actors have and how they actually have a great impact on more than you think.

I would like to thank my supervisor at the company, for taking his time to introduce me to the industry and the company, but also for his support. Further, I would like to thank Peter Birch for the support and guidance throughout the thesis. Finally, I would like to thank all of my colleagues that agreed to do the interviews, and for answering all of my questions.
Popular science summary
A Study about the use of Resources to Strengthen the Network Position - A Comparative Case analysis within the Defense industry.

This project is about how resources in the defense industry could be used to create a stronger network position. In recent years it has been suggested that companies should focus on the production of their core competence and outsource the rest. But in an industry like the defense industry, with its many laws, regulations and highly technological products, it might not be as easy. Therefore, it is important to see how a company in the defense industry should organize their resources within this highly regulated industry. Especially for a company like the one in the report which produces in batches and has long lead times, and therefore gets under prioritized by its suppliers due to the low procurement volumes. Batch production is when a product is produced in lower numbers and could be compared to mass production which could be produced in millions. Primarily this is a subject that concerns companies within the defense industry however, it is suggested that the same rules might apply to other highly technical companies which also has a low alternatively batch production like the airplane industry. It is also interesting since it suggests that previous research in industrial networks might have to consider other factors which has not been considered before, like offsets.

The research presented also suggests that even though resources could be considered as heterogeneous, there might be some resources that are more valuable than others depending on the case. For instance, relationships and trust might be of greater importance when the price is higher, the lead times are longer and it is a relationship where the parties involved have a different kind of culture. This means that there is more at stake than if the prices are low and you could get a new one in a day.

If more companies would start to look through their relationships and how they conduct their network, it could possibly cause a ripple effect on suppliers, forcing them to perform better and offer better services. However, it might also lead to a reduction of smaller companies. If the bigger companies decide that it is better to produce some products in-house, smaller companies might lose one of their biggest clients due to this strategy and thereby not be profitable enough to continue. Therefore, companies must start performing better and put higher demands on themselves in order to not lose customers.
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1. Introduction
Developments in technological industries are progressing at an increasingly fast rate and the defense industry is no exception. New technologies, materials, regulations, customer demands all influence the product development process in arms producing firms. Due to this, companies must look beyond their internal resources and see what the best overall strategy is when developing new products as well as understand how resources optimally should be combined and why. When bringing in and considering external competences and resources, you look at the network of stakeholders and resources and use them, and not only what exists internally. These networks comprise some sort of relationship where some sort of value is exchanged.

Networks can be seen everywhere but they might not be recognized as networks. One example is airplanes where they leave one airport and fly to another and thereby create a connection. So a network can be seen as a structure where nodes (stakeholders) are related to each other by specific threads (exchanges) (Håkansson & Ford, 2002). One of the focus areas today in this kind of strategic research is about the benefits of integrating customers in the product development process together with other stakeholders (Bergman & Klefsjö, 2012). The purpose of doing this is to understand the user needs and to create a product that is developed by users for users, but that also work from other perspectives. Research on the subject has shown that user and customer involvement in product development more often leads to success than when not including the user (Laage-Hellman, et al., 2014). Often two types of customer involvement are recognized, intermediate users and consumer users. In this research, primarily the former will be used to understand the full network and what stakeholders and these are also the ones that generally have the strongest connections to the company. The interaction between Saab Dynamics (hereby Saab), the organization which will be used for the cases in this research, and the end-users are often very limited which makes the intermediate users the most logical to examine as a first step. However, the latter will also be used since a lot of the information gained from the intermediate users originally come from the end users. Håkansson & Snehota (1995) mention how business relationships between two companies often are not created in isolation but they are the result of a broader context. Further they show how activity links in various relationships can have an impact on nearly every aspect of a company’s operations, such as the production processes and the product development. Therefore, other relationships, especially supplier relationships, will also be examined in this research.

In traditional product development the main focus was on designing a product with focus on factors such as speed, quality, cost efficiency (Boothroy, 2012) and sustainability (Güngör & Gupta, 2002). The focus was on the tangible core such as on a machine or a plant and how the rest of the supply chain delivered was not considered as being their responsibility. But as competition has been increasing, literature today suggest that suppliers must put even more focus on not only the internal processes but on the full network in order to satisfy the customers and create an advantage. There is also a trend in literature which suggest that you should outsource the production that is not considered as a core competence (Wynstra, et al., 2001). This means that companies would use external resources instead of having them themselves. But this balance of deciding what to keep in-house and what to outsource is not an easy task which has been proved by Saab that still has problems with the structure of the network. As
Saab still has a lot of its production outsourced, there has been noticeable problems with suppliers not delivering on time, with low quality and with the wrong documentation, Saab is considering ways to strengthen the supply chain and make it more stable without compromising the control over its technologies. To examine this issue two cases from Saab will be studied and analyzed by using the 4R theory, and the two cases appeared quite naturally due to discussions that appeared from the construction of the Quality Manual mentioned below. This is something which seemingly has not been studied in the defense industry before and therefore will fill an important gap as a way for organizations similar to Saab to position themselves but also for future theory. To see the result from these two cases, the following questions will be asked.

**What Products are involved in the product development?**

**Which Production Facilities are involved in the product development?**

**Which Business Units are involved in the product development?**

**What Business Relationships are involved in the product development?**

Once the resources have been analyzed separately, it will be examined how they were used to create the most value which brings us to the main question:

**How have resources been combined to expand and strengthen the network?**

Since this is such an extensive assignment, the main research purpose will be to identify and map out primarily external but also to some extent internal resources and how they work together. This will be analyzed based on empirical evidence from two cases. From an IMP perspective, resource development is a result from the changes in resource interaction processes, which could be affected by the combination of resources and resource interfaces (Bocconcelli, et al., 2018). The resources that in some way influence the product development process will be analyzed by using the 4R-model. This theoretical framework will be combined with the empirical findings of the interviews as well as internal documentation at Saab. The reason for mapping out the external network is due to the lack of understanding on how the network actually looks and what the different stakeholders do.

As mentioned two different cases will be analyzed. The first case is about Saab’s supplier ACAB, and why it was procured, how the integration between the two parts was implemented and most importantly, how this change in resources affected the product and the processes. This analysis will create an understanding of how this type of merge can influence the network and other resources. The second case that will be analyzed is a project from where a customer, namely Country X has, expressed a need for a product, to winning a contract (meaning that they have chosen a supplier). This is to map out where and why the different stakeholders are involved and what resources that influence the product management and how resources could work as enablers to open up for new markets. The final purpose is to analyze how Saab as a resource collaborates and combines with other resources such as knowledge, products or facilities and how the combination influences the product development and customer satisfaction. This is due to Saab’s previous problems with how to structure the Supply Chain in the way that creates the best value for both the customer and other stakeholders.
2. Literature review
The literature in this report is rooted in Industrial Marketing and Purchasing theory
and how it relates to customers, customer satisfaction, innovation, and technology transfer. This
type of research is becoming more current with researchers such as the IMP group empathizing
the importance of it.

2.1 Product Network Design
As previously mentioned, there has been a shift during the last decade or so towards a more
global product development that also has a greater focus on Services, Quality and Relationship
Management. A lot of engineering productions are moving to other countries due to one or more
of the following: Lower Costs, Improved Processes, Global Growth or Technology Access (Jha,
2012). Table 1 below is based on Jha (2012) that separates the conventional production model
from the Global one:

<table>
<thead>
<tr>
<th>Conventional Product Development</th>
<th>Product development in Production Networks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mainly focused on Co-Located Teams</td>
<td>Globally Distributed Teams</td>
</tr>
<tr>
<td>Uses Engineering Technology Located in the existing Centers</td>
<td>Taking advantages of engineering technology in multiple geographic locations, including low, medium and high-cost regions</td>
</tr>
<tr>
<td>Uses a combination of digital product development tools and conventional paper-based processes for engineering</td>
<td>Uses an entirely digital product development process to facilitate collaborative engineering.</td>
</tr>
</tbody>
</table>

Table 1. Conventional product development vs. Product Development in Production Networks.

As a result from the increase in both globalization and competition, organizations are moving
away from just producing products to also provide services both before and under the
purchasing product as well as during the phase out of the product. And this do not only conclude
the traditional services like consulting and optimizing the machines/plants. Especially
important is it to provide service packages in highly segmented markets where the competition
is even bigger. There it is also important for the supplier to be innovative in the services
provided to be able to respond to changes in markets (Buse, et al., 2001).

2.2 Industrial Networks
The Industrial Designers Society of America (IDSA) defines Industrial design as “the
professional service of creating and developing concepts and specifications that optimize the
function, value, and appearance of products and systems for the mutual benefit of both user
and manufacturer” (IDSA, 2019). Walsh (2000) mention in his report that design is a part of
the innovation process and that the design makes a contribution to both the marketing,
production and new product development which are all important in a successful innovation.
But even though the industrial design is important, it does not really bring in the external
resources. Bringing in and unifying external and internal participants (resources) is something
that is required to have an effective product development (Koueftos, et al., 2005). The view on
networks has changed immensely throughout time, before customers often chose the supplier
that could offer the cheapest product or service, without much thought of the hidden costs and consequences that often follows when switching supplier. Relationship theory in networks dates back decades but did not really catch on until later. Håkansson & Snehota (1995) were some of the first people to recognize the need for an increase in research within the subject.

2.2.1 Manufacturer – Customer Collaboration
Johnson & Ford (2002) argue how the needs and demands of the customer being in the focus in marketing. Therefore, an analysis of the customer requirements such as customer needs work as a natural starting point in new product development in marketing. Working closely with customers or users is often a way to increase the chances of developing new successful products and technologies. But Johnson & Ford (2002) highlights that the negatives in joined product development often are overlooked. Factors such as loss of critical knowledge and skills, as well as increased dependency are some of the possible disadvantages. But it also brings advantages such as: product ideas, information about user requirements, assistance on development, testing of prototypes and so on.

2.2.2 Manufacturer – Supplier Collaboration
But manufacturers are also trying to involve the suppliers in the product and process development. Wynstra, et al., (2001), mention that this is important with an increasing outsourcing and a growing importance of product innovation. The integration of procurement and product development has become a key issue for many firms and can lead to reductions of cost and an increase in innovation. In development management, four activities have been recognized by Wynstra, et al., (2001):

- Deciding which technologies that should be kept in-house;
- Formulating guidelines for how suppliers should be involved in product development;
- Formulating guidelines for purchasing-related activities;
- Communicating policies and procedures both externally and internally.

2.2.3 Relationships
Industrial Networks consist of stakeholders that are interrelated and that in some way influence the network. Traditionally, companies mainly used took responsibility in managing the internal company however, companies have expanded their responsibility and begun analyzing ways to manage business interactions between companies and other stakeholders. These different relationships create networks and are constantly changing and evolving. When there is a change in a network, there will also be a change in both companies and relationships, which means that companies seeking change will always depend on the approval and acceptance of others.

Håkansson & Ford (2002) mean that Relationships often are complex, long-term and are the result from previous interactions between business units. Relationships enable companies to cope with their technical dependence on others and the need to tailor offerings to more specific requirements. The external company relationships influence the internal companies as well. But all of these relationships influence each other and Håkansson & Ford (2002) mention that when there is a resource or activity shared in the relationship, there will be either a positive or negative
connection between them. Thus, Håkansson & Ford (2002) means, that all interactions can be understood without reference to the relationship of its part. The opportunities and limitations of a company are related to the resources invested in relationships as well as to the internal capabilities. These resources and relationships (both external and internal), can be combined in many different ways which creates opportunities for innovation. Johnsen & Ford (2000, p.2) mention that “innovation is increasingly recognized as being the result of the combination of different knowledge and expertise that exist within different organizations i.e. relationships may have interactive and complementary effects on technological innovation”.

2.2.4 Combining and Transferring resources
This new way of conducting business: involving different stakeholders, providing services, cooperating and so on, takes away some of the focus from the economic gain into social, informational and technological gain, and one way to inherit new knowledge is through the transfer of technology (Hartley, 2017). Technology Transfer is the interaction process between two or more entities with the purpose to increase or stabilize transferred knowledge/technology (Battistella, et al., 2015). This could for example be between suppliers and customers or between divisions in an organization. The information transferred can support the Product Development and increase the level of innovation but also to create a better and more sustainable relationship (Håkansson & Ford, 2002). But for the technology transfer to work, there are a few barriers to the transfer of knowledge. In their literature review, Battistella, et al., (2015) mention the three potential barriers: Trust, Intensity of connections, and Distance.

1. In literature it is suggested that without trust, any transfer or development of knowledge will fail (Battistella, et al., 2015; Rusanen, 2009). The more trust there is in a relationship, the easier and better the sharing of knowledge will be. But to establish a relationship of trust, Battistella, et al., (2015), argues that it is necessary to ensure a strong sense of reciprocity and Rusanen (2009) means that in a Network Perspectives, trust is built up through the exchange of resources.

2. The intensity of connections is another important role in the resource and Knowledge Transfer. It is suggested that a high number of relationships will increase the probability of access to new relevant knowledge as well as improve the access to new relevant data. But once accessing this new data, the organization must be able to absorb the knowledge as well. Even though many relationships will increase the probability of new data, it is important to still keep a strong relationship between the entities. Battistella, et al., (2015) mention that strong ties lead to greater transfer of knowledge and also a greater understanding of the knowledge.

3. Lastly, different kinds of distances play a great part in the possibility of Knowledge Transfer. The types of distances that are organizational, physical, knowledge base distance, cultural distance and normative distance. The different kinds of distances, no matter if they are physical or behavioral, create gaps that must be bridged. This is why the organizations must work closely and have good relationships. In a study by Tóth, et al., (2017) they speak about the tension that can occur in networks. They mean that if there are much negative tension, such as power differences, it can harm more than benefit business relationships.
Product Management is defined by Wynstra, et al., (2001, p.77) as “those activities regarding purchasing integration in product development that are directly aimed at (the design or specifications of) the new product”. This includes how a project should be managed, deciding which suppliers should be included and how you integrate development between first tier suppliers and second tier suppliers. But it also includes the activities of what information about the product that already exists, and what alternative suppliers, products and techniques there are to achieve higher product quality Wynstra, et al., (2001). It is suggested by Bocconcelli, et al., (2018) that resource interaction might help generate value from the use of specific resource combinations, however on the contrary, if the resources are inefficiently combined, the result might be the opposite and negatively affect the value creation process.

The ARA framework is a well-known model within Industrial Network theory. But as mentioned by Sundquist, et al. (2003) previous research is greatly focused on the Activity part of the framework. But in the last decades, the focus has shifted into the resources and the learning that takes place in the use, combination and recombination of resources and how it enables new innovative resource use (Welch & Wilkinson, 2002), and how it can differentiate the industrial firm’s offerings (Jevnaker, 2001). Understanding how resources works and how they could be combined to increase the performance of a firm is considered as an important topic within business management (Håkansson & Snehota, 1995; Baraldi, Gressetvold & Harrison, 2012). It is suggested that the combination of resources, if used correctly, could result in the generation of economic value (Cantu, Corsaro & Snehota, 2012) as well as increase innovation (Johnsen & Ford, 2002) and technological development (Ciabuschi, Perna & Snehota, 2012). However, as Johnson & Ford (2002) also mention, networks might also inhibit innovation in the way that it might increase dependency on other actors as well as increase the risk of dissipation of sensitive knowledge to third parties. The 4R model is a well-known model within IMP theory that is used to shed lights on the process of resource development. Bocconcelli, et al., (2018) motivates the use of the 4R model by the following three reasons. Firstly, the model helps in understanding and exploring the resource development and interaction processes. This in turn will help in the exploration of combining and recombining available resources. Secondly, the 4R model enables the mapping of various resources (Products, Production Facilities, Organizational Units, and business relationships) across organizational boundaries. Lastly, the 4R model can contribute to making a product more valuable and relevant without necessarily developing its inner features but by improving its direct and indirect features.
3. Theory
The theory presented in this report is firstly based on based organizational theory. Following that there is a short presentation of previous theories in product design such as DfM and DfS. Then, the theory of industrial marketing and purchasing theory is presented which suggests that there needs to be a network perspective in product design.

3.1 Organizational networks
In recent years, the trend is going towards especially smaller and medium sized organizations buying services and products instead of producing them in-house (Bocconcelli, 2018). Research has shown that these types of networks bring advantages. First of all, it creates more flexible organizations since it becomes easier to break external contracts if they do not fulfill the expectations (Jacobsen & Thorsvik, 2008). Secondly, this type of network solution can lead to lower costs because you can negotiate contract prices. Finally, by outsourcing some of the production, the core company can focus on the core competence. But, disintegrating also has its consequences. It might be hard to cope with all of the stakeholders and the company might be seen as such a small stakeholder that the sub-suppliers under prioritizing the relationship. It might also be that the cost savings are not that big due to an increase in transaction costs and core competence might decrease due to less knowledge within the company (Jacobsen & Thorsvik, 2008).

The success or failure of a product can originate from the responsiveness to customer needs, the viability of the core concepts, the producibility of the design, the robustness of the functional quality, the economical precision of the production, the success of integration, the effective reusability and the strategic impact (Clausing, 1994). Sometimes to achieve a successful product, the requirements of the customers must be combined with technical opportunities in innovative ways, to create attractiveness to the customer. This is not an easy thing to do, but it is vital in today’s increasingly global market (Bergman & Klefsjö, 2012). But be able to satisfy the customers’ needs you can not only look at the quality of the end product, but the operations also need to perform, and there are four ways to do this (Slack et al., 2015):

- Speed - Doing things fast and minimizing the time between when a customer asking for a good to delivery.
- Dependability - To do things on-time and keeping the promises given to the customer.
- Flexibility - Being able to change the product to cope with unexpected circumstances as well as introducing new products.
- Cost - Doing things to a price that is suitable to the market.

In product development theory, there has been many different theories with different focus on how to actually design a quality product, and include various stakeholders in the process while improving the operations in some way. Some of the theories are Design for Manufacturing, Design for Assembly, Design for Disassembly and Design for Sustainability. Design for Manufacturing (DfM) and Design for Assembly (DfA) first started getting formally discussed in the late 1960s early 1970s. Bouge (2012) writes about the importance of, Geoff Boothroy, a
well-recognized researcher within this era, known for developing a method for a DfA to estimate the time required for a manual assembly of a product and the cost of assembling it on an automated machine. From this research he recognized that the most important cost reduction in the assembly is to minimize the product’s component count by either eliminating components or combining them with others. Design for Manufacturing/Design for Assembly (DfM/A) tools and principles are used to provide a structured approach to achieving simplified designs for products that can be manufactured effectively. In 1980 Boothroyd published Design for Assembly: A designer’s handbook but the DfM/A guidelines were quickly replaced by software. The DfM/A benefits are primarily related to what can be done in-house by doing things like minimizing part count and minimizing the use of fragile parts which often leads to both time reduction and cost reduction as well as reducing the product complexity in the production process (Bouge, 2012).

But in recent year, new theories have emerged as a consequence of people wanting more out of products than only functionality, now things as aesthetics, multi-functionality, efficiency and eco-friendliness has become an important part in product development (Won-Shik, et al., 2016). From this, theories such as Design for Sustainability (DfS) has appeared. Design for Sustainability is when a product is responsibly designed from an environmental perspective. This means that the products should be designed for durability with the least possible waste. This could be done by reducing the total weight of a product or using alternative more eco-friendly materials (Birkeland, 2002). Similar to DfS, Design for Disassembly is also becoming more popular. It can shortly be explained as a complicated reverse Design for Assembly line (Battaïa, et al., 2018). The main difference from DfA is that the quality, quantity, reliability of parts and subassemblies also are included in the consideration. The purpose is to salvage valuable materials and parts from the End of Life (EOL) or discarded products to keep them from polluting. Designing for Disassembly can also make it easier to repair products and thereby extend the life-cycle (Güngör & Gupta, 2002). Lastly, Manufacture for Design (MfD), has appeared. As the focus before was primarily on functionality, producers are now trying to make products that are desired by the customer rather only producing manufacturing friendly products whilst reducing price. The concept of Manufacture for Design (MfD) is to cover the needs of the customers which often nowadays are customized products, the opposite of the DfM paradigm which promotes standardization (Won-Shik, et al., 2016). So while DfM/A has a great focus on reducing costs and time, MfD focuses on first making sure that the products are coveted, and then look at the production chain.

3.2 Industrial Network Perspective

Even though there are so many different design theories, many of them are focused on the manufacturing process as a single process and do not bring in external factors. In where the surrounding world is heterogeneous and dynamic, organizations often tend to try to become innovative. One of the most mentioned strategies to handle a changing world is organizing networks. This is when an organization consists of many smaller and/or bigger units and stakeholders, which cooperate and exchange resources. These resources could be either goods or services, knowledge (Jacobsen & Thorsvik, 2008), capital, people, structure, processes, skills, competencies and relationships (Kandampully, 2002). This was recognized by
Håkansson (1995) who created the ARA (Activities, Resources, Actors) framework. The traditional approach to the activity dimension revolves around the type of product and how they should be produced. But there are also other external factors such as natural, technical, political, economic and legal factors that also can cause additional complexity. Design is not only there to put together the physical products but it should also connect and combine the firm's resources to create the best possible output (Baraldi, et al., 2001).

Internationalization have over time attracted considerable interest in Industrial Marketing and Purchasing (IMP) research considering both International Business (IB) relationships along with the importance of business relationships and business networks (Baraldi, et al., 2018). In a study by Håkansson & Ford (2002), one of the main conclusions about IMP studies was that one of the best ways to understand a company is by looking at its business relationships since they can be both inhibit and benefit its development. Relationships between organizations are most often not created and developed in isolation, but can be considered to be a part of a network of independent firms (Håkansson & Snehota 1995). These networks are the systems of suppliers, consultants, collaborators and other stakeholders that all more or less affect each other. The relationships, or the “threads”, between these stakeholders can look different, some might be working closely together with a high dependency on one and other, and in some there might barely be any interaction. The stronger the relationships are the stronger are also the threads (Håkansson & Ford, 2002). The market performance of the organization also highly depend on how it functions in relationships with others, and the volumes, market share, profits and growth, all depend on how the company handles its relationships (Håkansson & Snehota, 1995). These business relationships do not only include the direct suppliers and customer but stretches out to the entire network (Håkansson & Snehota, 1995). Therefore, the strategic view within IMP is not only to develop and care for single relationships but also how to combine several direct and indirect relationships to achieve its goals. The development of IMP can be described as the development of a research network consisting of a large set of activities, resources and actors (Håkansson & Gadde, 2016). Traditionally IMP has had two different areas of research, the first is about the researcher community in terms of individuals and roles, and the other one focuses on the development of ideas in terms of different kinds of knowledge. But there has also been a numerous of tools and models coming out from IMP and one is the ARA model which is used to analyze business development. This separation of three layers is a central part of IMP theory and used to analyze the industrial networks in terms of activities undertaken by actors through the utilization of various resources. In reality these are completely intertwined but theory claims that they need to be separated (Insanic & Gadde, 2014).

The Activities in the ARA model refers to what the company do, such as combining, developing, exchanging or creating resources by one or many actors. These activities shall fulfil some specific function in the network as a whole and therefore they also have an impact on other stakeholders in the network which makes them interdependent. These serial interdependencies are handled through adjustments to make them more efficient and therefore there is a need of coordination between actors (Insanic & Gadde, 2014). One example is if you stop producing a product and thereby do not need a supplier anymore. Then the change will have more or less of an impact on the supplier depending on how dependent the supplier was on the customer.
Additional to the serial interdependent activities, there are also activities performed in parallel which are analyzed in terms of the similarity among activities. The activities are similar when they exploit the same resource element, and similarity is crucial for economics of scale. This could be through the use of the same transportation vehicle, the same recovery facilities or the same workforce skills (Insanic & Gadde, 2014).

To carry out the activities, the organization need **Resources** which is a combination of physical, technical-, financial-, and human assets. But it also refers to intangible resources such as know-how, trust, brand image, tacit knowledge and so on. But organizations rarely have all resources in-house and therefore some has to be acquired by others. IMP theory departs from the assumption that resources are heterogeneous which implies that the value of a specific resource is not a given but depend on how it is combined with other resources. Therefore, interaction is necessary for both knowledge and value creation. But all these resources utilized in the transformation are then combined with other resources (Insanic & Gadde, 2014).

To analyze these complex resource relationships, the 4R model can be used (Håkansson and Waluszewski, 2002). The 4R model was developed to analyze how resources change over time in relationship to other resources. These combinations of resources can take place between either the same type of resources or of different types. The model distinguishes between four resource categories: two physical and two organizational/social. The first physical resource is the Products (P) which are the physical products transformed. The second physical resource are the Production Facilities (PF) which represent the resources used in transformations such as infrastructures in logistics and manufacturing, vehicles, machines, information systems and material handling equipment. The first organizational resources are the Business Units (BU). The Business Units consists of the organizational structure, personal skills and competences that characterizes the organization. The Business Units also imply an identity, financial resources and economic accountability which allows them to interact with other business units. The second organizational resources are the Business Relationships (BR). The Business relationships are the substantial links, bonds and ties which is a result from firms interacting. The BRs are considered as resource due to their importance for the involved firms. The relationships could also be used as a strategy to achieve certain goals (Baraldi et al., 2010). These relationships are crucial for an organization due to factors such as effective resource combining among firms. By combining the resources in different ways the consequence could be an increase in value creation. The IMP perspective on resources means to place an emphasis on resource combinations embedded in various contextual dimensions and characterized by interaction and change over time.

The final layer of the ARA-framework is the **Actor**. Both firms and individuals are actors that establish relationships in business networks. These actors can be both between internal departments as well as external. How the connections are treated within the various stakeholders decide how the relationships will look as well as the outcomes of the relationship. Depending on where you are in the life-cycle the actors vary but the task of the actors is to coordinate activities and combining the resources (including financial, physical and human resources) through their business relationships. These interactions in the business networks vary and can
to both long-term, temporary, with a high involvement or barely any involvement at all. And while high involvement offers benefits in terms of for example joint resources, knowledge sharing and so on, it is also costly and time consuming (Insanic & Gadde, 2014). But innovation occurs in a network between firms and therefore innovation is impossible without changes in structures and firms involved (Rusanen, 2009).
4. Methodology
The research performed was abductive, meaning that data was gathered and adopted throughout the process depending on the outcome from the interviews. It has been argued that abductive methods should be the guiding principle of empirically based theory construction due to the researcher being a part of the world studied and not only basing its research on existing data (Timmermans & Tavory 2012). The abductive approach also allowed changes in the direction where the research was going which was an important part of the end result. Instead of being controlled by previous research, the empirical data steered the research to open up for examining what actually happened instead. The research could be compared to positivism which has the role to test theories and provide material for the development of laws (Bryman & Bell 2007). It could be used to provide frameworks that can be used to draw conclusions of a company’s structure and functioning of organizations. The result from the research could then, be used as a way for organizations to organize better. The data gathering primarily consisted of four parts. The first source of data was from a Supplier Quality Assurance Manual. This manual was created on the request of the company. It was supposed to work as a resource to communicate the needs and wants of Saab to its suppliers. To create this manual, many interviews was performed which then also worked as an information source and inspiration to this research. Secondly, previous literature and theory was gathered, just to get an overview of the research area. Then the empirical data was gathered, both the context data which worked as a guidance through the research, and also the empirical data which primarily was gathered from the interviews but also from Saabs intranet. The reason for using interviews was due to the lack of information about the industry. The area is quite unexplored as a consequence of the industry being information sensitive. This data gathering process was an iterative process and once new data occurred, the research sometimes was redirected.

For the literature review and the theoretical data, the data was gathered from Uppsala University’s online library but also from a various amount of education books. The main literature used in the literature review and the theory is founded in industrial networks and industrial marketing and purchasing research. Information was also gathered from IMP Groups online webpage where there is a various amount of research papers within the IMP area. To find information related to the 4R theory keywords such as ARA, resources, relationships and 4R were used as search words. To use this, keywords proved to be of value since the ARA framework is such a unexplored theory which has been used in a very limited way.

4.1 Supplier Quality Assurance Manual
The Manual was as mentioned created on the behalf of Saab and worked as resource in the data collection for this research. Even though it was created before this actual research, it still played a great part in the understanding of the company, the industry and the common problems that occur in the network. They had experienced some issues with suppliers not performing according to Saabs standards and therefore they wanted to create this manual as a way to communicate the expectations. To create this manual, data was collected through a number of long interviews and discussions with employees. Data, such as KPIs was also analyzed, to see what the most common problems were with the Suppliers and the deliveries. This data was then also used in this report, both directly and indirectly and was therefore valuable as a researcher to understand many of the issues discussed in this research.
But there were some risks when creating this manual. The first risk was that the document quickly would be forgotten and not used in the procurements. To avoid this, employees from all parts of the production and procurement sectors were involved. Involving people in the research could make the research process more collaborative and could be seen as a form of respondent validation (Bryman & Bell 2007). In the interviews it was important to understand what the most common quality problems and highlight them in the manual. Then, once the manual was created it followed an iterative process of being sent out to employees and managers according to the process in Figure 6. After the first two rounds of interviews it quickly became clear that the internal processes did not look the same. Depending on whom you spoke to and on which site, different Employees had different views on how things were performed. Then it became obvious that this manual not only would work as something to be used to the suppliers but also bring knowledge and standardization into the organization.

Figure 1. The process of creating the manual

Another potential risk was that (especially the really small or big) suppliers would refuse to use and follow the document. In these cases, the person responsible for the customer contract will together with the supplier create a common solution which could be to create an exception or Saab helping them in the initiating stage. But the main purpose of the manual is to demand higher quality and therefore if the suppliers cannot deliver accordingly, Saab will if possible replace the supplier. This will lead to higher costs initially as it is an extensive and expensive process to acquire new suppliers, but if it reduces the number of not-approved products and/or faulty deliveries, it will be beneficial long-term.

4.2 Empirical Data
The empirical data for this research came from three different sources, the Supplier Quality Assurance Manual, Saab’s intranet and from interviews. The two cases presented in this report heavily relies on the empirical data and therefore it was important to gather as much as relevant data as possible. At first the purpose with this research from the company point of view was to create the supplier quality manual. The empirical data has also been gathered through interviews and online internal documentation at Saab. The cases described are two completely different cases, but both of them have the same purpose which is to show different resources and how they are combined. The first case is about the procurement of ACAB, one of Saab’s suppliers and how they have had an impact on the network position and the second case is about a RBS 70 NG project in Country X and how Saab won the project by the use of resources.
4.2.1 Interviews
Open in-depth interviews were performed with Saab employees and managers in different positions within product development in the organization. The interviews were open due to the limited amount of information available. Having open questions also allowed the respondents to mention what they felt was most important for them to mention and not be biased by my questions. When having more structured interviews, the researcher might without even knowing it form questions that will lead the respondent to some answers (Bryman & Bell, 2007). During the answers of the questions, new more structured were formed to ensure that there were no misunderstandings and to complement the information which is especially important in open questions where there often is room for misinterpretations (Bryman & Bell, 2007). Interviews were also being performed with some of the external stakeholders to get a different perspective. The respondents were chosen based on their involvement and knowledge in the different processes to access as much information as possible. The length of the interviews varied depending on about what they were interviewed about, but also depending of their knowledge about the case, so they varied between everything from 15 minutes to 2 hours. All of the interviews were recorded with the approval from the respondents and then transcribed. The transcribed data was then coded and summarized which can be seen in chapter 8. The risk when handling this type of data is that the data gets twisted (Bryman & Bell, 2007), to avoid this the respondents read through the answers to ensure that they were correct.

An important aspect when performing this type of qualitative research is to protect the people involved in the research (Bryman & Bell, 2007). It was made sure that the respondents were aware that they would be anonymous in the research, both to make them feel more secure but also in able to gather as much honest data as possible. Therefore, all names mentioned in the report has been replaced with alternative names. If the respondents felt insecure about the interview, the summarized result from the interviews were sent out to the respondent so it would be possible for them to change their answers. In this kind of research and in this type of industry, it is important to understand the possible consequences that could occur if the wrong data gets out. The data might not only affect the interviewee and/or the researcher but it could even in a worst case scenario destroy relationships between countries. As a final control of the research, a manager at the company read through the research to ensure that no sensitive information gets out.

4.2.2 Problematizing - empirical data
A problem when collecting data in the type of industry is that there is a lot of information that is classified and usually it is quite hard to know what is classified and not. Therefore, when a respondent is not sure whether something is classified, they must choose not to say anything about it. Data such as economical numbers and KPIs from the cases is something that is not open data which means that there is no way to access it and in some cases it seems like there is no data to access. By not having any quantitative data it is harder to ensure that the empirical data is not only speculations by the interviewees. Therefore, data which not could be confirmed in other interviews have been left out to ensure the reliability of the data. It has also been implicated by some of the respondents that information often is divided between employees to decrease the risk of complete information being spread through corruption. This has made it
harder to gather data that is valid and complete, and also to find key people to talk to. Due to this issue, the information sometimes has been gathered from the stakeholders instead of internally since it was so hard to find key people. This however might bring a less biased view on how the suppliers work together with Saab so it might lead to an even better result.

4.3 Analysis of Data
The analytical framework underlying the cases was continuously modified as a result of the empirical findings together with the theoretical framework. The results from the interviews and the empirical data were first presented separately and then when being analyzed, the 4R tool was used. The 4R tool allowed a comparison of the two different cases to find common nominators as well as differences in the cases. To finalize, it is mentioned in the discussion how Saab used resources to expand and strengthen their network and how the result potentially could be used in the future as an advantage.
5. Empirical context
This section describes the industry with data collected from various interviews and observations at Saab. Some of the information was also presented by the Procurement Manager at the beginning of the thesis work to get an understanding of the Industry which in turn would help in the creation of the supplier Quality Assurance Manual. This will be followed by an identification of Saab’s procurement process which will be a key process in the understanding of the second case.

5.1 The Company
Sweden has for a long time had a policy of neutrality and non-alliance while it still has been considered as one of the major arms exporters in the international arms trade. During World War 2, Sweden was cut off from all foreign imports and therefore had to become self-sufficient which led to the development of the current market in terms of size and structure (Ikegami, 2013). In 2017 the Swedish company Saab Group was in the top 30 of the top 100 arms-producing companies in the world, yet it is still considered as one of the smaller companies internationally (Saab, 2018). However, Saab Group is, at 40% of the total export, Sweden’s biggest exporter within the defense and security industry, and in 2017, they employed over 16,400 people. During the years Saab Group has expanded and merged with other companies and suppliers, creating one big concern located in different places in Sweden as well as in other countries of the world. Saab Group consists of six different business areas: Aeronautics, Dynamics, Surveillance, Industrial Products and Services, Support and Services and Kockums (See Appendix 1 for organizational structure). The one that will be used in this research is Saab Dynamics, hereby mentioned as Saab. The reason for analyzing this Business Area is due to the connections and access of information that the researcher has. This business area is in turn divided into Ground Combat, Missiles, Underwater Systems, Training and Simulation and Barracuda (Appendix 1).

5.2 The defense industry
The defense industry lacks research within some areas. A lot of the research is about the structure of the industry or ethical aspects but there is much less research within actual companies, which could be due to the highly secretive industry. The defense industry works and looks very differently from other industries. One reason why is the demand. A country’s need for defense materiel is driven by their assessment of the threat environment. If there are many conflicts and threats in the world, the governments traditionally put more money into their defense budget. Another factor that separates the defense industry from other industries is the development time. Many products in the defense industry have a long product development time as well as a long service and maintenance time. This puts high pressure on the arms producing companies that must produce products that will not be obsolete when finished. Finally, the defense industry is highly dependent on the performance and quality of the products and services. While you in many industries can choose to do a trade-off in the performance of a product to save money or time, this is often not the case in the arms industry because here the consequences of a missing function are life depending.
5.3 Saab’s Procurement Process
Prestby & Dahlin (2015) created an internal Saab document to describe the procurement process of Saab from a customer perspective. The purpose of describing the process is to create an understanding of how defense customers manage the procurement of products. This process is highly integrated with the design process since the product is created from the customer requirements. Below, the procurement process from the customer’s perspective by Prestby & Dahlin (2015) is described in combination with Saab’s internal management system is explained. A picture of the process can be seen in Figure 1.

![Integrated Product Creation Process (IPCP) at Saab](image)

5.3.1 Identify Needs.
Customer Perspective
The first phase in the defense procurement process is to identify the capabilities needed by the armed forces to fulfil missions. This is through both top-down capability needs such as capability to withstand future threats, but also bottom-up needs such as replacing ageing equipment. These capability needs are then prioritized and Saab tries to find different solutions to close as many gaps as possible according to the prioritizations.

Saab Perspective
Saab does not only produce products based on what the customers want. Saab continuously identify and assess market opportunities based on the end-user interest and needs, customer opportunities and need, market and industry trends and technology breakthroughs to decide whether to invest resources or not. Once a market opportunity is identified, they are translated into requirement specification for the commercial product (Solution/System/Service) and decide whether to include it or not in the product portfolio and provide relevant release plan.

5.3.2 Consider Options.
Customer Perspective
The needs can then be addresses either by (1) an upgrade of current equipment, (2) by buying new equipment or (3) through R&D development of new equipment. The purpose of the evaluation is to define a statement of requirements which includes the operational concept, key
performance data and date of deployment, required quantity of equipment, as well as an estimated cost for the procurement program. Most often the procurement agency is responsible for the evaluation, and create a Request For Information (RFI). The RFI is a description of what capabilities the buyer is looking for with the purpose to gain information about the equipment available on the market. From this a Rough Order of Magnitude Offer (ROM-offer) is made which includes a proposed price and the suppliers gets their final chance to influence the final requirements to promote their solutions which sometimes includes (a costly) demonstration of the product. This is where the customer gets to see if the products fulfill their capability gaps. Then the evaluation is finalized with a definition of a defense procurement program that includes a statement the operational concept, required quantity of equipment, key performance data and date of deployment, and an estimated cost for the procurement program.

Saab Perspective
Here Saab analyze and evaluate financial and commercial costs, and what potential risks there. The industrial cooperation (See chapter 8.3 for information about industrial cooperations) function is also involved to get an indirect offset. The projects potential profitability is calculated and from this a price is proposed to the customer. The terms and conditions are also presented and Saab applies their terms and conditions if possible and the legal function is also included to consider the terms.

5.3.3 Budget Decision.
In the mid-term procurement plan is where the customers apply for money for the procurement (E.g. Ministry of Defense in the UK) and it is decided if the procurement will proceed, be postponed or withdrawn.

5.3.4 Procurement.
Customer Perspective
In the procurement stage there is little room for Saab to influence the customer since this is handled internally. But if the procurement method has not been chosen it will be decided now depending on factors such as the industrial policy, the volume and so on. Then when selecting the actual supplier, the suppliers that responded positively to the RFI will be the primary candidates. There are often also formal requirements such as registering with authorities or industrial corporations (offsets) which often are crucial in order to facilitate access to business. When the suitable suppliers have been selected, a Request for Proposal (RFP) is made which includes a technical specification, maintenance plan and price proposal. The RFP is a more detailed formal request than the RFI and demands more effort and commitment from the supplier due to the importance of the details being correct. If details like the cost is wrong, it could cost the supplier a customer. This is where the supplier has the opportunity to provide a competitive advantage and shape the offer. Often the suppliers are invited to clarification meetings where the supplier can present their offer and potentially change the offer. Then depending on the case, a few suppliers with the most qualified proposals will be more thoroughly evaluated.
Saab Perspective
In this step Saab tries to influence the customer by arranging meetings, verify offset demands, ask questions about the customers’ needs/wants, and present why Saab should be chosen and what competitive advantages Saab offers. Demonstrations (if not performed in the Consider Option stage) could be performed here. This is also where Saab tries to find out more about the competitive offers and try to match them.

5.3.5 Negotiation.
Lastly the most qualified supplier will with the best proposal (tender) will be invited to negotiations. The negotiations specifically handle the Terms and Conditions of the contract but also, when applicable, conditions for offsets and technology transfer.

5.3.6 Deviations from the Procurement Process
But Prestby & Dahlin (2015) mention that the process does not always look the same. Depending on which country you are in there are different laws, standards and expectations. Another example is the identification of needs. While countries such as Japan and Korea have clear Defense and Security Policies some countries do not really have a plan and instead copy their neighboring countries. This also has an impact on how the countries conduct their procurement, some being very structured, knowing what they want and some being much less sure about their needs. Finally, the process of choosing a supplier is not always as easy as picking the one with the best offer from a time, money, offset and a technology/quality perspective. In the defense industry, politics plays a great part in the procurement of products. One example is in the US where there is the Buy American Policy which means that the United States Government shall prefer American products in its purchases. Another example is in Sweden where different processes such as import/export, and customers and suppliers of Saab must be approved by ISP - Inspektionen För Strategiska Produkter (The Inspection For Strategic Products) to make sure that the procurement is handled in a correct way.
6. Empirical data
The following chapter consists of summaries from different interviews and internal documents. Two different cases are explained, the case of ACAB and the case of RBS 70 NG.

6.1 Product Management Overview
The Product Management department has the purpose to ensure that the new/developed product will be profitable. The profit is then reinvested in new products since it is important to have a long-term vision to make sure that Saab has competitive products. They in turn work together with the market area which is responsible for the sales of the product. Together they have the purpose to win deals so that Saab becomes the supplier of a product.

In the Product Management department, Saab separates from many other defense producing companies since many other firms are funded by their customers when developing their new products, which Saab also has but not at all to the same extent. Before, the latter mentioned way of performing business was preferred but nowadays there is trend going towards Saab’s way of conducting business since it is less risky and cheaper. But this way of conducting business is much riskier since if Saab do not design a product that is attractive, they might have spent a lot of time and money on a product that will not be sold. Therefore, it is crucial for Saab to understand the needs of the customers in order to either win a bid (See Integrated Product Creation Process) or, to create new needs and influence what the customers need/want long before the customer even does and put them in the RFI. Because if an RFI comes out that Saab has not influenced, Saab either has to offer an existing product (a so called catalogue product) or a completely new product. The way that Saab wants to strategize and separate itself from other companies is to have the best offer on the RFI (to cover the customer’s needs) to the lowest possible price. Therefore, it is not as important to be much better at something (e.g. product performance) but more to offer the “full package” such as cost and quality. Due to all of these factors, the product design process becomes quite complicated and another thing that makes it even more complicated is the long product development which easily could be a 10-year project (from customer need to delivered product). So, the products do not only have to satisfy the customer needs now but also in the future. So to decide where to invest the money, the Product Management department gather information from the network, look at future needs, look at future trends in technology, and use this information to make decisions.

6.2 Industrial cooperation and offsets
To understand some relationships in the defense industry you have to understand Industrial Cooperations and offsets. These are special types of relationships that could make or break a deal between a country and Saab. In an interview with Anna, an employee working with these types of relationships, the difference between the two were defined. Industrial Cooperations could be either expectations or they can be agreements where the buyer in the contract includes the condition that the seller has to perform activities that benefits the buyer, in the latter case the cooperations are called offsets. The so called ‘offset’ relationships do not work the same way as with ‘traditional’ suppliers. Either the suppliers are owned by Saab (subsidiaries) or they are local, but they are almost always located in the country of the procurement. One of the differences here is that the offset, especially if they are Saab-subsidiaries, often has Saab as the
main client and therefore Saab do not need to worry about being under-prioritized the same way as with the traditional suppliers. However, the purpose of these types of cooperations and the reason why they often are considered as being so important is to strengthen the domestic defense industry of the procurer as well as increasing the economy of the country. This could be through for example knowledge transfer, creating extra jobs, or the possibility to develop technology. So this is a way for countries to (beyond the economic benefits) use the transferred knowledge and capability to enhance their own domestic R&D as well. Today, offsets are not legal within the EU since the European Union reckon that they create unfair businesses with unequal opportunities to win business contracts.

Anna also mentioned that Industrial Cooperations often are considered as being something risky and impractical. The risk with Industrial Cooperations is that too much information or technical competence will be shared with the supplier and that they will use the information in ways that will damage business. Some countries even have a strategy to not only use the transferred knowledge from Saab but also to examine the products to copy the ‘secret’ parts of the product. Hence, Saab sometimes would rather spend more money in opening up their own sites locally than risking to share expertise knowledge. So there is a fine balance between Saab transferring enough knowledge for it to be considered as valuable to the buyer but still keeping the expertise in-house. This is where Anna and her colleagues together with experts together try to evaluate how much that should be shared and the value of the knowledge that is shared.

Another negative with the offset relationships is that you still have a network to manage which is not an easy task and something that might demand extra time and resources. But the offsets also bring benefits to Saab. In the interview with Anna, it was mentioned that Industrial Cooperations is a good way to win or at least create an interest in a customer. They sometimes also work as a way to get closer to the countries and open up for new businesses in the country. By opening up offsets you create new connections to countries and nations and therefore increase the possibility for future cooperations. These offsets could then be used for future products which would decrease the new offset costs.

6.3 Case 1 ACAB
Saab has been shaped by its history with many acquisitions of companies as well as sales of parts of the company throughout time. At the end of the 90’s, Saab started outsourcing a lot of its production to focus on what they defined as their excellence areas. However, following this move, the trend switched and Saab started acquiring its suppliers again to ‘control its own fate’. However, these big changes in the organizational structure has resulted in problems both with the internal (Saab) and external (to customer and supplier) communication. Something that is even more obvious between the Business Areas and Business Units. This has resulted in people having different processes and views on how things are to be performed and what demands there are.
Today Saab has a quite extensive in-house production with many of its components as well as the assembly of the products, being produced and performed in-house at many different production sites. However, some of the components and semi-finished products such as sights are still produced at either the offset suppliers or other sub-suppliers. This is often due to the lack of competence in-house or offset demands. It is also due to the high cost of the projects and the development. The reason why Saab has been trying to integrate the production is since they have noticed that relying on external suppliers have brought its negatives. One reason is due to the influence that Saab has on some of its suppliers. Even though Saab could be considered as a larger industrial company in Sweden, it is still considered as being one of the smaller arms-producing companies in the world. It is also not a mass-producing company but they generally produce in batches. This influences how they procure parts for their production since when something is procured, it is usually purchased in quite small batches. This means that the suppliers barely earn anything when they are in business with Saab and therefore Saab often gets under prioritized and therefore often have problems with poor quality products and especially bad services on some of its products. The problems could be related to slow deliveries or not complete deliveries which in turn can result in massive delays in production which are both very costly but also that has an impact on Saab’s supplier - customer relationship. So to avoid delays and to be able to perform better, Saab sometimes acquire the suppliers to get a more stable production.

Another reason brought up by an informant was that it due to the high dependence on the supplier. The supplier might be the only one producing a certain component which makes Saab vulnerable if anything would happen to the company. So especially if the company is close to being bankrupt or if there is a problem with a product, Saab could make the supply chain more stable and procure the supplier. But procuring other firms has shown from the interviews to bring both benefits and problems. When acquiring another firm, Saab gets the knowledge that the firm possess, resources such as the buildings/machines, and also more security in the production process. But it also brings problems such as “they against us” feeling and a lack of standardization between the different locations. One example was ACAB that was an important supplier of composites and then in 2017 was procured by Saab. ACAB once belonged to Saab but was then sold as a result from the trend to disintegrate. Saab Applied Composites AB (ACAB) is a top-technology company located in Linköping Sweden, that focuses on composite based solutions for civilian and military applications. ACABs goal with its products is to achieve maximum security and top performance while keeping the weight low. Composite is a material that is made from two or more different materials, which in combination create a new material with different characteristics than the original materials (ACAB, 2019).

The initial reason for the procurement of ACAB is not something that is known to many people. But in an online document in Saab’s intranet, a top positioned manager, Johan mention the following about the procurement "This is a very important and crucial acquisition for Saab. By integrating ACAB into Saab we will get improved control of key components of the supply chain for Saabs product portfolio. At the same time, we are creating synergies with ongoing production that will create efficiency gains, improved competitiveness and value for our customers". In an online statement from the former President of ACAB, Einar, the following
was stated “Even though we had good, close cooperation with Saab while serving as a subcontractor, I see benefits of being a part of the business. We will gain even closer cooperation, and being a part of Saab will facilitate the establishment of synergies in development projects and production, which will result in greater efficiency, competitiveness and value for our customers.” But the actual reason to why the procurement was made is not stated.

However, in an interview with Lars, a former long-time employee at ACAB, it became clear that the prior mother company to ACAB, GKN, decided to sell ACAB. The reason for GKN selling ACAB was due to the deviation in products from their own core products. GKN is a company that is more involved in industries such as the automotive industry while many of the products manufactured in ACAB primarily are used in the firearms industry. This, Lars believes, is why GKN decided to sell ACAB and instead utilize the revenue for development within their expertise area. In another interview with Andreas, a former ACAB employee, it was mentioned that the products produced in ACAB are key components in many of Saab’s products and that Saab stands for a high number of the procurements. Therefore, Andreas means, it was “a natural step for Saab to procure ACAB”. The motivation for why it was important for Saab to procure ACAB was unanimous from the interviews and the unanimous reason presented in the interviews why it was important for Saab to procure the products was to secure the availability of the resources such as the products, the site, drawings and so on. Something that is supported by Johan’s statement in the article. Securing the availability of resources is something that is even more important now due to an increase in the demand of some of the products that contain the components produced by ACAB. A second reason that also was mentioned in the interviews which also is closely connected to the first one is to secure access to the competence (both technological knowledge and the tacit knowledge) within the organization. But the procurement also brought other benefits that might not have been the main reasons for the procurement but that still impacts the end product and therefore the end-customer. One of these effects were better quality. Stina, A Saab employee that was involved in the integration of the two companies mentioned that “even though the products generally had high-quality, there were still some problems with late-deliveries and inconsistency in the product quality”. By procuring ACAB, Saab could get a better control over the site and the production processes which also is the case according to Johan and Einar. This means that they could improve the processes, easier make changes according to their needs and also take part in the resources that existed in-house.

Being able to share resources was something that proved to work as an advantage in Saab’s own production of composites. When ACAB was procured, Saab and ACAB worked together in order to produce better products and components in a more efficient way. The result from the cooperation proved to work and both the products at ACAB and at Saab improved. The procurement also eliminated many middle-hands, which lead to a reduction in time. This is something that was confirmed in an interview with a Rickard, the Production Manager. The Production Manager’s task is to bind the different functions together within the production. This includes the actual operations, the planning & logistics, quality management, transportation, and so on. In the interview it was mentioned that he already has noticed a
difference in the amount of on-time deliveries, and that he was expecting to see an even bigger
difference in the future. Rickard confirmed that they sometimes had problems with delays in
deliveries from ACAB. But he also adds that this also could be due to customers not
understanding the processes and therefore putting too short delivery times.

Another thing that decreased were the costs due to factors such as an increase in control and
time reduction. Rickard continues that it also is expensive to maintain suppliers and ensure that
they have proper controls, follow rules and regulations, to transport the products, protect
knowledge and so on. If a supplier has not been utilized for a while, costly processes such as
First Article Control and other audits must be performed. Lars further mentioned that he
believed that the integration would lead to better and faster communication due to ACAB now
adopting to Saabs own intranet. One of the first steps when ACAB was procured was to let
everyone apply for new/or their own positions to integrate the staff. But as mentioned by
Andreas, this did not only bring benefits. Even though the integration brought many benefits
on paper the integration was not as smooth in some ways. Andreas mentioned that the people
working at ACAB did not really have as much support as they would have liked to. They had
to learn new programs that are used within Saab without no true support and someone to turn
to. However, this is something that Andreas does not really want to get in to in more detail.

6.4 Case 2 RBS 70 NG
The second case is the description of a project from the identification of a need to a contract
being signed, so the IPCP process. Most of the information gathered to this case is from Carl,
a person that worked in sales and therefore with the project from the beginning. The case is
about Saab’s product RBS 70 NG (see Figure 2) and the process how it came to be procured by
a country. Even though the procurement was transparent and the information is public the
country will be anonymous and referred to as Country X. The reason for the anonymousness is
due to the sensitivity in these types of procurements.

RBS 70 NG (New Generation) is a short distance air
defense missile system that has an effective intercept
range against incoming targets of 9 kilometers, and
an altitude coverage of more than 5000 meters. It is
the fourth generation in a row of successful missile
systems. The new generation part is a key
component in the product and is considered by Saab
as the best and most innovative components on the
market. Due to secrecy, the type of product will not
be mentioned. The component can also be used
within other products such as vehicles and remote
control which makes it a valuable asset for Saab.

Country X is a NATO country and were in an agreement with NATO that they before 2023
should provide a short distance air defense system. The need for a newer air defense system
came from changes in the surrounding world such as increasing threats and new technologies.
This new need was something that was public information so Saab was also aware of the fact that Country X might need products. Country X is also a country that previously has done business with Sweden and especially Saab. So during a meeting with some end-users in 2007 about another product, Saab also presented a Power Point about RBS 70 NG which then, only was a prototype. The prototype was received well and Saab got some development funding for the product, something that is quite common within the defense industry. However, as Carl mention, the people there are known for being quite cynical, pessimistic and resistant to change. This means that except the challenge of producing a product that responds to their need, there is also a cultural difference and a trust issue that needs to be bridged.

There was a need for a new short distance air defense system and Country X presented an RFI and started a tendering process where they invited different actors to present their products. The actors then gave an ROM-offer which where they tried to respond to as many of the needs of Country X as possible. From these offers Country X created an arbitrary budget. With the ROM-offer and the budget set, it quickly became clear for Country X that Saabs product covered the needs the best and an RFP was made, directed to Saab and the product, RBS 70 NG.

In the RFP, Saab was aware that they still had to bridge this cultural and trust gap and Carl mentioned that their strategy was to “become like Country X”. To do this, Saab wanted to bring in as many components produced in the country as possible into the product. Therefore, Saab contacted a sub-supplier from Country X to together with Saab develop a sub-component that would be used in the RBS 70 NG. This sub-supplier was not a supplier with any special competence that Saab did not possess and Saab might as well have developed the product in-house at a lower cost. As highlighted by Carl, this could actually be seen a cooperation with a competitor. Usually, these types of competitor relationships occur when there is a lack of competence however, this was not the case here since the cooperation functioned more worked as what Carl mentioned as a Win-Win situation, where the supplier got an increase in revenue and Saab got access to knowledge as and also indirect, an increase in trust. So, the outsourcing of the component was something that is very favorable from a political point of view and it also showed to become innovative and according to Carl the best component in the market. So perhaps Saab also benefitted in a technological perspective which they might not would have if they had been produced in-house.

This cooperation was a so called Industrial Cooperation and Country X did expect Saab to do something similar to this so that the procurement also benefitted the countries own industry. As known from the interviews there often is a risk with industrial Cooperations but in this case, the knowledge shared from Saab was not that extensive, but the value was in the industrial benefits and the creation of jobs. And Saab did not only benefit from the cooperation by bridging the cultural gap and gaining trust, they also got inside information about how the industry works in Country X. But, Saab did not only create a relationship through these Industrial Cooperations but they also tried to “stay close” to Country X. To do this, employees of Saab often travelled to Country X to show off their products, the prototypes and so on. So Saab used a lot of Country X resources and infrastructures such as shooting fields. Saab also travelled to Country X to
perform the product verification. All of these interactions and cooperations was a way for Saab to behave less like a Swedish company and more like a company from Country X. But outsourcing some of the production also has its negatives. Carl mention that from his own experience, outsourcing often leads to less qualitative products and a loss of control. He continues that it often is considered beneficial to keep the production of important components in-house to secure the quality and the supply of the products. This together with it being much cheaper to produce in the country is also why Saab only used the one supplier in Country X and not more.

During this RFP step, there was a lot of problem with media involvement. Carl mentioned in the interview that they usually try to stay away from media, something that became impossible in this project. Once the other suppliers that was competing for the project realized that Saab was the front runner, they quickly went out in media to down-talk Saab and the products of Saab. This forced Saab to talk to media and protect their products. In all of this, the strong relationship between Saab and Country X became invaluable since without it, Saab might have lost the deal. But this media involvement still led to problems like a longer procurement process. This RFP process took about a year during which a contract was made that was then approved by Country X. This full process, from the initial Power Point in 2007 to the contract being signed in 2018 took 11 years.

But there were also other stakeholders that were involved in the process. One of these were ISP. ISP is an Authority that approves and gives licenses to organizations such as Saab that wants to export products. This process is important for a number of reasons but one of the main reasons is to ensure that no products are procured or sold to regions where human rights are violated. In an interview with Anders, a key connection between Saab and ISP, it was mentioned that all suppliers and customers must be approved by ISP for the products to be exported. In this case it means that ISP played a vital part in not only if Saab could work with Country X but also if they were allowed to use the supplier in Country X. But for the supplier to be approved by ISP, FMV (Försvarsrådet och Materialverket) is also involved. FMV is an authority with many purposes and that often, directly or indirectly are involved in the export of products. In an interview with Sara, an FMV employee it was mentioned that FMV could function as a way to build trust between countries. Examples of these kinds of relationship is NATO and the EDA (European Defense Industry). EDA has the mission to support and simulate R&D within among the state members. Both Sweden and Country X are members of EDA which increases trust between the countries even more. But the connection to NATO is just as important. Even though Sweden is not a part of NATO, they still need to ensure that their products are compatible. FMV ensures that the products produced at Saab, are compatible with the products of Country X (since it is a NATO country). Lastly, FMV also classifies the products that are exported from Sweden. The reasons for the classifications is to ensure that the technique in the products are secured to protect Swedish export.
In an interview with Lisa, from Saab’s Treasury and Risk Management department, it was highlighted how important different banks are for procurements. Lisa mentioned that when a customer of Saab makes a procurement, they often have to pay some sort of financial advance. But then the customer can demand a guarantee that Saab will deliver according to agreement and if not, the money will be returned. To guarantee this, Saab can contact banks that will function as a protection. But in (especially bigger) procurements, the banks might want to share the risk, and then EKN (Exportkreditnämnden) is contacted. EKN is an Authority with the purpose to benefit Swedish export. If a firm is in business with EKN, they pay a premium depending on the risk of the deal. Once a company is in business with EKN they are ensured payments in export trade which protects the stakeholders in an agreement (EKN, 2019). EKN and the banks work as financial risk managers and thereby they also benefit the Swedish export.

In this specific project, Carl mentioned that they offered Country X to be supported by both banks and/or potentially EKN. This would have worked as a security for both Saab and Country X, however Country X declined the offer. The reason why they declined it is not known but Carl mentioned that it could be due to their cultural differences and/or trust.

Saab also wanted to use this procurement to better establish their business in Country X. Saab wanted to outsource the production of missiles to the RBS 70 NG to Country X. This is due to the long term benefits for Saab, both to integrate better with Country X which is an important customer to Saab, but also due to it being more economically beneficial for Saab. It would also have been beneficial for Country X with benefits similar to Industrial Cooperations. However, Country X has still not made a decision yet. Carl believes that this is a key relationship in the future of Saab and that these countries could cooperate in the future to sell/produce products and thereby also share risks, costs and knowledge. However, Carl believes that the cultural difference still is a problem and that it will take some relationship building for the cooperations to succeed.

In parallel to this process, Saab is also trying to find their own suppliers to produce their products. Usually Saab first decides if the products should be produced in-house, however sometimes Saab does not have the resources and an external must be used. In cases where there is a need for a bigger supplier the process usually follows IPCP where the supplier with the best bid wins the business. But when choosing smaller suppliers, the process does not always follow the IPCP process. In an interview consisting of four people from the procurement department, it became necessary to understand why some suppliers are used and why some are not. When a Procurer gets an order they have a list of suppliers to order the different components. Usually there is only a few suppliers to choose from and sometimes Saab have designated ‘preferred suppliers’, otherwise the procurer most often chooses the supplier based on experience. But the components that will be put on order are quite often complex, special made or in small batches. This rules out some primarily bigger suppliers since producing for Saab sometimes does not even lead to a profit. Therefore, Saab often orders from small family owned companies where Saab often is their number one customer. Some of these are also partially owned by Saab (50/50). The reason for this is often that they do not have the resources to produce on their own without getting bankrupt. By being the part owner in companies like these Saab once again benefit from the relationship by having a great influence on the supplier. But the benefit from
having this kind of relationship Saab do not have to have the same control as would have to if they were completely owned by Saab. Therefore, from a Saab perspective it is beneficial to have 50/50 ownership since they gain more control yet they do not have to manage the whole firm. From the supplier point of view they can continue on with their business and can also access more resources while still keeping their (family) business.
7. Analysis
In the beginning of the analysis a short mapping of stakeholders is presented. Then the different resources presented in Case 1 and Case 2 are analyzed by the use of the 4R theory. The theory works as a mean to separate the different resource layers in the networks with the purpose to get a deeper understanding on how the network looks. The analysis will be limited to the Integrated Product Creation Process (Figure 1), so from a known/unknown need until a seller is chosen and a contract is signed. After the 4R analysis, it will be discussed how the different types of resources are combined with other types of resources.

7.1 What Products are involved in the product development?
When looking at how Saab conducts its business it complies with what Jha (2012) define as Product Development in Production Networks. For Saab it would be hard not to conduct its business like this due to the high number of external and global stakeholders that influence and gets impacted from Saab. Product development generally starts with a need and a product should cover that need. This is recognized in theories such as Manufacture for Design (Won-Shik, et al., 2016), where the product is manufactured based on the customers’ needs. But to do all this, the stakeholders needs to perform and deliver quality products.

In the case of ACAB, the merge resulted in better quality products, shorter lead times and on-time deliveries. As an effect from this, it is expected that the cost of the production will go down which in turn will benefit both Saab and the customers. The merge also resulted in an increase in the overall performance and process stability. As Slack, et al., (2015) mention, the quality and the cost of the product is not everything, but also the speed, dependability, flexibility. In the case of RBS 70 NG the product played a big part in the procurement. The performance was like no other on the market, with a component that had inferior performance than others. This worked as a selling point in the procurement between Saab and Country X.

7.2 Which Production Facilities are involved in the product development?
When looking at the product development process, Wynstra, et al., (2001) suggests that four activities need to be recognized to increase innovation and reduce cost, and one of them is to decide what technologies that should be produced in-house. In both cases a key issue has been to decide how to deal with the suppliers.

For a while, Saab believed that they should outsource the production that is not considered as the core competence. This was partially to create a more flexible organization but also since it is easier to break external contacts and also because it might lead to lower costs (Jacobsen & Thorsvik, 2008). ACAB was once a subsidiary to Saab but was then later sold due to the trend that everything should be external. In Case 1, it was once again procured by Saab. When it was procured, Saab had access to the Production Facilities and equipment. However, as mentioned by Insanic & Gadde, (2014) resources do not have a value in itself but they need to be combined to create a value. Even though Saab might have benefitted from the Production Facilities, this does not mean that they would have benefitted from it as much without the combination with the Business Relationship.
But ACAB was also changing their intranet to Saab’s, which leads to the process from an order to delivery much faster and it also becomes easier and faster to make changes. As a result, there has been a decrease in late deliveries from ACAB and as mentioned by Slack et al., (2012) speed and flexibility is important for the customers. Disintegrating is supposedly also a way to reduce costs (Jacobsen & Thorsvik, 2008), however in the interviews about ACAB the opposite was stated. As mentioned in the interviews it is expensive to maintain suppliers due to the extensive quality and regulatory work such as performing Audits, the establishment of agreements/contracts, performing FAI (First Article Inspections), export licenses, ISP approvals, transportation costs and insurances, and so on. Many of these costs reduced or were completely eliminated at the procurement.

In Case 2, the Production Facilities and Equipment proved to become more meaningful to Saab than intended. When choosing the Sub-supplier in Country X the actual purpose was to build a stronger relationship to the country something that is recognized by Buse et al., to be especially important in highly segmented markets. But it did not only do that, it also resulted in the development of the new innovative component. If the component would be as innovative if it had been produced in-house is not something that could be established, however, as suggested by Johnsen & Ford (2002) and Ciabuschi, Perna & Snehota (2012), there is a known phenomenon that the combination of resources can lead to innovation and technological development which might indicate that bringing in a Sub-supplier might actually have increased the innovativeness. Another activity mentioned by Wynstra, et al., (2001) is to communicate policies and procedures both internally and externally. The supplier Quality Assurance Manual is a way for Saab to communicate the policies and such to the supplier to create an understanding and mutual foundation. Therefore, this manual is expected as mentioned by the Procurement Manager to reduce unnecessary conflicts and reworks and thereby save money, time and strengthen relationships.

7.3 Which Business Units are involved in the product development?

In these specific cases there has been a greater focus on external resources than internal resources. The internal Business areas and Business Units has definitely influenced and played its part in these cases however due to the complex Organizational Structure it is a work in itself to find and analyze the value that they have brought in the cases.

However, one area that needs to be mentioned is the production which is a part of the product management area. The production manager mentioned that they see the effects once a change like the procurement between ACAB has been performed. They are also the ones that notice first if there are incomplete deliveries, if the products are of poor quality etc. Therefore, they can evaluate the changes and see the effects from them and weather they could be considered as successful or not. This evaluation step is something that is missing today but the information is valuable to decide how to combine resources for the best possible output.

Another important area, especially in the case of RBS 70 NG is sales. The sales area lies within marketing and they are the ones that primarily deal with the IPCP process, they are the ones that should find customers and sell the products. These are also the ones that sold the RBS 70
NG to Country X. These need to work together with the production in order to be able to answer to RFIs in the correct way and see what is possible and not. The information exchange between the two has to work in order to not suggest a product for the customers that will not work. So while the sales area tries to see what the customer wants, they communicate the need to the production to see if it is possible to fill the need. As Slack et al., (2015) mention, dependability is crucial in order to satisfy the customer’s needs.

7.4 What Business relationships are involved in the product development?
Within both cases there were a mutual foundation in the Business Relationships which could be recognized with Battistella et al., (2015) and their three potential barriers to transfer of knowledge: Trust, Intensity of Connections, and Distance. But there was a substantial difference between how important the Business Relationship were in both of the cases. In Case 2, most of the case built on trust between the Saab and the customer. Even though Saab had a good product, it was brought to the surface that Saabs problem was not the product but to build a relationship with the customer.

The first obvious issue from Case 2 was the Trust. Country X is, as mentioned by Carl, a country that is recognized as being quite cynical and conservative when it comes to relationships. Rusanen (2009) mention that trust could be built by exchanging resources. In the case, there are multiple examples how Saab and Country X exchanges different kinds of resources with the motivation to strengthen the trust, but also to bridge the other two barriers. Carl mentioned that their strategy was to bring in components from the native country, this Saab did by contacting and developing a component for the RBS 70 NG together with a supplier from Country X. Saab already had the resources in-house to develop a similar product at a lower cost however, to win the trust of Country X this was a necessary move to win the deal. But it also brought more benefits,

First of all, it helped in the closing of the distance gap. By working together with the suppliers in the country, Saab also became more integrated in Country X. As Battistella et al., (2015) mention, Distance is referred to both cultural, physical, knowledge based and so on. So from the suppliers Saab got much more than just the components, Saab also got an understanding in how the culture is, how the processes work, intensity of connections and so on. So as Carl said, Saab tried to “become like Company X”, both by getting to know the culture and the processes but also to utilize other resources that the Country provided such as the shooting ranges. But this industrial cooperation also brought other potential long-term benefits. As mentioned by Battistella et al., (2015) it is not only the intensity of connections that matter but also to make sure that they are sustainable. Industrial cooperations is also a strategy to establish new businesses long-term. Carl mentioned that Saab in addition to this project also wants to work together with Country X in the future and the Industrial cooperation could be a step towards that. In the interview with Anna, it was mentioned that even though it could be risky to have offsets, they sometimes work as a way to build a strong base in a country and then indirectly get access to even more resources.
Media also proved to have an impact on the relationship between Saab and Country X. Once it became clear that Saab was the frontrunner, the other competitors started contacting media, bashing Saab and the products that forced Saab to protect its reputation. Unfortunately, this delayed the procurement process and Saab had to try to convince and disprove the accusations. Carl mentioned in the interview that if Saab at that moment would not have worked with gaining trust, he is not sure how it would have influenced the deal.

Similar to Case 1, the closing of distance gap and intensity of connections also played a part in the merge of ACAB and Saab. However, not seemingly as much as in Case 2. ACAB was and still are one of Saabs most important suppliers of Composites and other highly technical components. In turn, Saab was at 85% of the total sales, ACABs most important customer. So in difference of Case 2, there already was a close cooperation between the two. But for Saab to secure their access to ACABs components when ACAB was put to sale, it became self-explanatory that Saab had to procure the company, especially since Saab already have so many orders on products that contained components produced by ACAB. But even though the purpose of the procurement was to protect the organization due to their dependence on ACAB it also brought other positive consequences. The Intensity of connections, is something that is important in order to understand and transfer knowledge (Battistella, et al., 2015). Saab mixed the staff when they procured ACAB which lead to some Saab employees working at ACAB and vice versa. This reduced the ‘they versus us’ feeling and the employees started working together from the beginning. This created a strong relationship between ACAB and Saab employees. The integration of the employees also reduced both the physical, cultural, organizational, and knowledge differences. So once ACAB was procured, the expertise knowledge in the company became the ‘property’ of Saab and they could start producing products together and share knowledge.

7.5 How have resources been combined to expand and strengthen the network?
From the interviews some stakeholders in Saabs network were mapped which can be seen in Figure 3. The arrows represent a resource being transferred which could be one of the four types (4R) presented above. Some of the stakeholders presented in Figure 3 are not mentioned in the report since they were not relevant for the cases, but they are still relevant for the network. Even though the stakeholders in this picture is only represent the closest stakeholders from the two cases, the complexity of the network is still obvious and also how much the different stakeholders not only interact with Saab but also how they interact with each other. The purpose of this research was see how these resources, based on two different cases, were combined to produce a better end result.
As mentioned by Jacobsen & Thorsvik (2009) it is crucial to have the ability to adapt and strategize in today’s fast changing tempo, and according to the Product Manager Saab often tries to capture the need of the customer before the customer even knows what he wants. Bergman & Klefsjö (2012) mention that being able to combine the customer requirements with technical opportunities is a way to attract the customer. Therefore, the production and sales departments must work together to utilize their personal skills and achieve this combination of resources. Johnson & Fors (2002) also mention that analyzing customer needs work as a natural starting point in new product development marketing. When Saab was in Country X speaking about another project, they already heard of this agreement between NATO about a new short distance air defense system. This was not secret information but Saab decided to capture the opportunity and present RBS 70 NG. However, the major issue in this case was not the product itself but the relationship between Country X and Saab. The case of RBS 70 NG brings in another dimension and allows a new perspective on what resources that are included. In this case, the cultural and physical distance together with trust played a big part in the relationship. To close this gap, Saab used resources from external actors in Country X to show their dedication. This in turn led to the component, the new innovative product which nowadays are used in other products and not only BS 70 NG. This comes to show how one of the biggest resources in industrial networks is trust which also is supported by the research of Battistella, et al., (2015) that mention that trust is a reoccurring subject and could also be considered as the most important resource. However, as resources are considered as being heterogeneous, there is no vale to it alone but could be considered as one of the fundamental elementary resources.

The integration of Saab and ACAB led to the combination of new resources, which showed to positively influenced the value. First of all, the integration lead to new developed knowledge about composites. By not only integrating the organizations but also the employees, they
exchanged knowledge and skills which resulted in higher quality products and also a more efficient production. So the merge broke down some of the barriers that inhibited the flow in the Supply Chain, caused by authorities like ISP. The merge also allowed Saab to better control the production and thereby eliminate costs from audits and so on. But the integration also proved how the different types of resources can lead to different results. When combining ACABs and Saabs Production Facilities in composited it lead to even better products. Information like this is very valuable for Saab since they in the future can use it as a strategic tool when deciding what should be outsourced or not.

Figure 5. Merge between Saab and ACAB and effects from the merge
8. Discussion about the research
The following chapter will discuss the result of the research, and also in that see where it might be interesting to perform future research. There will also be a discussion about the quality assurance manual and, the what motivates people working in a company that is so ethically debated.

8.1 Discussion of Practical use and future research
Saab has an obvious track-record of trying to find their best way to manage their network, considering what to produce in-house and what to outsource. Jacobson and Thorsvik (2008) mention that outsourcing some production allows the company to focus on its core competences but if there are limited of suppliers in that component the supply is highly dependent on one supplier. Having suppliers is something that Johnson & Ford (2002) mean could lead to higher dependency and a risk of dissipation of sensitive knowledge, which in the defense industry is very risky. Further, one of the main issues in this research has been weather to outsource production to suppliers or not. As Jacobson and Thorsvik (2008) mention, it is easier to break external contracts if they do not fulfill expectations. But in cases like ACAB, where Saab highly depend on the supplier, I would based on this research, propose that Saab at least consider if it is not better to procure the supplier or find an alternative way to access the information to protect themselves. In the defense industry there are noticeably many stakeholders, laws, regulations, political views etc. that all makes the supply chain more complex than in other industries but also the transfer of resources. So what could be considered in the case of the sub-supplier in the RBS 70 NG case is whether it would be beneficial or not for Saab to procure the sub-supplier producing the component and if it would allow easier transfer of resources or not. If you compare the RBS 70 NG case to ACAB, the initial response that it actually might be beneficial. ACAB and the sub-supplier have many similar features and resources that would suggest that the outcome would be similar in both cases. Both of them have excellence in one type of product of where Saab has knowledge but not the product itself, Saab is a big customer of both, Saab already has the same type of production in-house, and Saab is highly dependent on both. Now the difference between the two are primarily two things, the distance (both cultural and physical) and the length of the relationship. While ACAB and Sweden had been in business for many years together, the relationship between the sub-supplier and Saab is new. 

We can assume that this type of procurement would benefit Saab if the merge itself were successful. This of course requires that the supplier would be open for a deal like this. The resources that Saab would gain such as the technological knowledge and the factories would be valuable for Saab. Short term it would benefit Saab since it would allow access to the components which Saab could use it in many more of its products. However, it would also lead to an initial high cost. Long term it might lead to easier access to resources within the country. Since Saab wants to start conducting more business in and together with Country X, a procurement would allow Saab to access even more resources in the country and at the same time form deeper roots and closer relationships. This is a strategy mentioned by Jha (2012) that mention that moving out the suppliers is a good way for global growth and technology access. If you look at Figure 5, you see that the procurement in turn will lead to new connections which in turn also has resources. But it will also increase the knowledge about the culture and the
Knowledge about culture is something that has been discussed within IMP theory but that still seems to be somewhat forgotten. In today’s global markets, the lack of cultural knowledge is an issue that should be highlighted and raised more as a resource.

Another future interesting research implication would be to do a more thorough analysis of specifically supplier relationships and the problems that occur when you are a smaller company internationally but considered as a larger company nationally. Especially interesting is it in an industry like the defense industry with the batch production and long lead-times. While working at Saab it was quickly brought to surface that Saab has had problems with the suppliers due to them not taking Saab seriously as a customer due to their small orders. In order to deal with not being taken seriously by their suppliers Saab took the initiative to choose their suppliers not only based on their products but also on their willingness to actually deliver high quality products to Saab. To communicate what Saab is to them and also show the expectations that Saab has on the suppliers a Supplier Quality Assurance Manual was created. However, this does not go to the root of how to strategically chose the suppliers and therefore I find the research area interesting and most importantly, important.

In the end, one of the most important factors is to keep the customer satisfied, without them, there is no profit. Therefore, you have to know what they want and are willing to pay for, and combine this with the technical competence. Involving the customer early in the process is something that Uyarra et al., (2008) means also can increase the innovativeness in projects. These needs must then be communicated to the suppliers for them to understand the expectations as well, since they also have an impact on the end result. In the case of ACAB, the procurement led to more efficient resource use and also a better delivered result to the customer. To deliver quality products to the customers results in stronger ties and also trust which could benefit the relationship long-term. Baraldi et al., (2010) mention that relationships could be used to achieve certain goals, so if Saab delivers high quality products with the quality and services that the customers request, RBS 70 NG, it will surely benefit Saab long term in terms of future procurements.

8.2 Discussion of Practical use and future research
One of the main contributions of this research is the mere use of the 4R framework. As 4R is a fairly new theory which has not been applied to that many practical cases before, this research worked as some sort of trial for the framework. Once the framework was to be applied on the
cases in the analysis, I had a hard time understanding how it would contribute to this work, and I still do. I believe that it could work as a way to easier find the resources since it opens up what resources actually is and how they could be used. However, I do not think that the framework helped me in any way to understand how the resources in the different layers strategically could be used as a way to understand how to combine them in the best possible way. Potentially, the result how trust is important in business relationships could be an effect from the framework however I do not see why I would not have had the same result without the use of the 4R. A reason why I think it might not have worked in these cases was due to the lack of information and details. If there were to be more detailed cases (which was not possible here due to secrecy) the use of the 4R might have been more beneficial than in this case. However, this is something to be examined in future research.

A second contribution to research is that even big companies sometimes have problems with suppliers due to low order volumes. A speculation on my side is that many companies see the trends in bigger companies and try to follow them without considering the differences in their organization and the network. There is no one fits all solution and the companies must do what works in their advantage. This might be a reason for these companies to integrate suppliers, especially if there is a high dependency on them and not disintegrate from the beginning like in the case of Saab. This is an important factor as it could be useful for companies with a similar organization as Saab for the future.

Finally, we could learn how services could be used to build stronger roots in other countries. In the theory it was mentioned that services nowadays might be almost as important as the product provided itself. In this case, the industrial cooperation between Saab and the Country X supplier, worked as a service in one way to the country. This shows how services actually could be used as a strategic advantage, to form deeper roots and connections, especially in a globalized company.

8.3 Supplier Quality Assurance Manual

While conducting this work it quickly became clear that the supplier relationships are highly complex but also important which is supported by the research of Wynstra, et al., (2001). As Saab has many smaller family owned suppliers they often do not have the knowledge and/or sometimes the will to drive quality work. But as Network Management Theory stresses, everything is interrelated and a change in one part of the network can have an impact in a totally different part of the network. From a network perspective, this manual will work as a resource for both suppliers, Saab as well as the customers, and finally the end-customers. It may also result in the creation of new ties in the network but also the elimination of some. As Saab has noticed, the quality of the products and deliveries (like in the case of ACAB) is not always up to standard which in turn affects the end product and therefore also the customers. So what Saab wanted out from this work was some sort of a manual that would be sent out to all suppliers as an appendix to the contracts. This in turn would work a resource for them to construct their own Quality Management System. The manual is presented in Appendix 2.
8.4 Limitations
As in any research, there are limitations to the research conducted. When conducting this kind of research where the resources shall be mapped in a complex company like Saab it instantly becomes extremely hard to understand the complete network. It becomes even more complex in the type of industry that Saab is in. In the defense industry, there is a lot of sensitive data that in the hands of the wrong person could have devastating impact. Therefore, a lot of the data in the intranet is classified which hinders the usage of it. This is something that all employees also consider which probably also constrain the answers from the different stakeholders that have been interviewed. As a result, there are further data that cannot be used which would be interesting to mention. This relates to another problem which is that you in this type of research collect a lot of empirical data but only from a limited number of people that also have a limited amount of knowledge. As the saying goes ‘there is always two sides of the coin’. But within the defense industry everything is so highly regulatory and information can be sensitive so it is hard to find people such as competitors to interview. This in turn could lead to some of the work being biased.

Except from the industry being much regulated it is also managed in different ways. As previously mentioned the industry works and looks differently depending on where in the world you are where some companies are privately owned and some by the Governments. There are also different rules and regulations all over the world such as FAR/DFARS, import/export regulations and so on that makes a complete analysis close to impossible, hence the focus is on the Swedish regulations such as ISP in this report. Further, there are also other influences that are hard to analyze in this type of research and that is the politics. In some standards such as FAR/DFARS there are demands on how the procurement should be performed (SOFF, 2019) including directions for transparency and requirements that the procurements from a supplier must be well motivated. But most often there are no such requirements, instead the procurements happen based on relationships between the countries and not on the actual offer. This supports the data in the research how important the Business Relationships are as resources and just how important it is to have good connections. However, this is hard to proof and even harder to analyze. However, excluding this type of data does not make the data invalid, it just gives the perspective from the chosen resources while further research could be performed from another perspective.

What has been seen in this research is how Saab in two different cases has used resources to expand their market share. Both cases are according to the empirical data collected from the employees, considered to be successful. In the case of RBS 70 NG it is argued that the combination of resources was what lead to the procurement, and in the case of ACAB the new combinations of resources improved the processes with effects such as reduction of time and cost. But even though many of the resources analyzed played its part there are probably many more reasons to the success of the change. Some factors such as path dependency are hard to explain and even harder to proof how and if it played a part. So even though the result in this report could be considered as valuable for future research and future similar cases, it should not be used as a definite receipt for success but more as to show that this could be used to strengthen the position in the network.
8.5 Ethical Implications
A dimension worth discussing when conducting research, especially within the Defense industry, are the ethical aspects. The defense industry is a special and highly criticized industry due to the purpose of its products which primarily is to defend Nations but also to attack when necessary. Before getting hired, all people are asked if they have understood and thought of the ethical implications of working at Saab. Only during the four months that I have been at Saab there has been two demonstrations against the company.

When arguing about ethics in the industry there probably are at least a dozen ways that you can argue about areas such as the ethics of the industry, the ethics of working in an arms producing company, as well as where the responsibility starts and ends in the supply chain. Even the name Defense Industry could be discussed because in some cases, the ‘defender’ is the one that actually attack. Ethics within technical research is something that is considered much more now than before with examples such as Engineers having their own Code of Conduct. In the Swedish Engineers Code of Conduct they mention that an Engineer “ought to feel personally responsible for technology being used in a manner that benefits humanity, the environment and society” (Sveriges ingenjörer, 2019), but at the same time it is mentioned that “Engineers ought to strive to improve technology and technological knowledge so as to achieve more efficient use of resources without harmful effects” (Sveriges ingenjörer, 2019). The focus in this chapter will be on the defense industry from the employee's point of view and why they consider the industry being acceptable to work at even though it breaks the Code of Conduct and many other ‘ethical statements’ such as the ten commandments and the UN goals for sustainability. Now, this discussion is not to argue what is right and what is wrong which would be an impossible task, but instead to analyze and discuss the industry (more specifically Saab) from the employees’ perspective. Therefore, I have performed 10 short interviews on the people working here to understand why they work at Saab and also how they feel about the industry. I did not tell any of them that the interview was about ethics until after the first question since I wanted to get an unbiased opinion about the company. These interviews were then summarized and analyzed based on the ethical theory by Lennerfors (2018).

The first question was an open question where I asked the employees why they started working at Saab. Initially when I asked, they all answered based on their own interests, something known as ethical egoism (Lennerfors, 2018) The common answer were due to it being a high tech company with interesting products. Some also mentioned that they started on the company due to the job assignments. So when looking at these answers, no one actually put any value into the industry except that it was a high tech-company and interesting for themselves. These answers indicate that no person actually mentioned the effects of the industry, the actual products or what Saab represents but more in the technology behind the products and the job being interesting.
After the first question I mentioned the purpose of the interviews and then I asked how they felt working in that type of industry. This small change, going from Saab to Industry, as well as making them aware about the ethical implications gave completely different answers. First of all, to motivate the choice of customers, many people mentioned ISP as a way to ensure that the products end up in the right hands. Now this touches the issue of trust within ethics. Lennerfors (2018) mention that trust is something that important for relationships and that good ethical action is something that builds trust. In many of the interviews it was mentioned that they are okay with the export of products since they only sell the products to the ‘good guys’ which is assured by ISP. The employees have trust in ISP. But, who are ISP to decide who the good guys and who the bad guys are? And Sweden is supposed to be a neutral country, yet it is still okay for Sweden to sell to some countries but not to other. Lennerfors (2018), mention rationalization and how people explain that they are not responsible for something. This means that rationalization is an excuse for doing something that should not be done. So if a weapon would end up in the wrong hands, will the employees deny responsibility and put the blame on ISP or perhaps some other stakeholder?

Another issue that was brought up was the performance of the products. As previously mentioned, many of the employees are interested in the high-tech products. In turn they justify working at Saab due to this. They mean that if the products were to be fired, the precision of the products is so good, that it will only harm the ‘bad guys’. But what makes it okay to harm anyone? This could be motivated through the ethical rationalization ‘denial of victim’, that the victim deserves what happens to them (Lennerfors, 2018). A few people brings up Saabs slogan “it is a human right to feel safe” as a motivation, another person “motivates by saying that “despite the consequence of the products, they are needed for stability” which within consequential theory is known as utilitarianism. Utilitarianism considers what the best options for ‘everyone’ and motivates actions based on that. Another person motivates by saying that “Sweden has to have some sort of defense” and to develop the products you must export to fund the R&D, which is known as Particularism. Particularism is when you maximize the good consequences for a community, which in this case is Sweden.

To summarize, it became clear that the initial reasons for starting to work at Saab were primarily due to the interesting high technological products. Once I again asked the same question but brought in the ethical dimension the answers changed. The industry was then defended and motivated by ethical theories such as Utilitarianism and Particularism, ant that the industry is vital to protect Sweden but also to protect everyone. The employees trust that the weapons end up in the right hands thanks to ISP and put the responsibility on them.
9. Conclusions
As mentioned by Cantu et al., (2012) it is suggested that the combination of resources generate in economic value, an increase in innovation (Johnsen & Ford, 2002) and technological development (Ciabuschi et al., 2012). These suggestions were confirmed in the analysis of the two cases. What could be added is that it also could result in stronger network relationships, a more stable supply chain and also expansions of the network.

This research has shown the importance of bringing in external stakeholders into the production design. Within this type of research, it might not be obvious from the beginning how IMP theory impact and is related to production theories like DFM. But as shown, IMP theory is highly relevant when deciding how a product should be produced since it has shown that it can lead to more trust between the stakeholders, and therefore result in the transfer of knowledge and technology. This does not mean that one theory eliminates the other but more that a combination is to prefer. This transfer showed to result in an increase in the product quality, a decrease in the cost of the production and product, a reduction of the production time and so on. However, at larger changes like the procurement of ACAB or choosing to use a supplier in another country, it becomes important to evaluate and follow up the results from like so they can be used in a strategic way to see if they are beneficial or not. This also shows how important it is internally that the departments work together and communicate.

This research also resulted in a Supplier Quality Assurance Manual. As shown in this research, the Stakeholders have a great influence on other resources such as the end product (and thereby the customers). In Saab there has been some problems where the supplier and Saab have had communication problems where the underlying problem was a lack of structure and agreed roles. So to both protect Saab and the suppliers, this manual was created to avoid miscommunication and thereby eliminate potential delivery issues in the future. This report will not go into use until after this research is conducted but what will be interesting is to see if and how the manual can lead to less errors such as lack of complete documentation. This is something that will be possible to see thanks to already existing KPIs.

Finally, this report brought in an ethical dimension. The purpose of the ethical dimension is not to point fingers but to get a thought process going, both in the reader and with the employees. The defense industry is such an extreme industry which also comes with people having extreme opinions. And the question whether the industry is ethically correct or not is a question that is impossible to answer due to people having different opinions and views on the matter.
10. References
Håkansson, H & Gadde., L-E., 2016. 40 years of IMP Research – the evolvement of the IMP network, Poland: IMP Conference.


Appendix 1.
Business Areas (Top Picture) and Business Units (Picture Below) at Saab AB.
Appendix 2
Supplier Quality Assurance Manual, to communicate Saab's demands and expectations. Appendix 3 from the manual is removed due to secrets.
Introduction
Saab Dynamics (referred to as Saab in this document) has a worldwide reputation of producing robust, high quality defense products with outstanding performance. This comes from Saab’s dedication and attentiveness to the customer and the customer’s needs. We want to exceed the customers’ expectations. Saab plans to maintain this business efficiency and strength by working closely together with its Suppliers to make sure that the requirements are clearly understood and that the Suppliers act with the urgency that the customers of Saab demands.

Purpose
The purpose of this document is to state the expectations that we at Saab have on our Suppliers in addition to the direct requirements stipulated in the purchasing documentation. In turn, this will lead to a more standardized way of working and thereby the risk of errors will minimize. To work with Quality Management in the defense industry is vital since a single error can result in serious damage to people. Consequently, it is extremely important to work towards having zero defects and Perfect Order Fulfillment (POF). POF is defined as ‘the performance of the supply chain in delivering: the correct product, to the correct place, at the correct time, in the correct condition and packaging, in the correct quantity, with the correct documentation and in accordance to the specified requirements’.

Applicability
This document is applicable to all Suppliers that must ensure that there are controls through the full supply-chain (including the sub-tiers) to ensure that the requirements are met. If there are inconsistencies between the contract requirements and this document, the contract requirements prevail. For specific customer contracts, any tailoring and/or additions must be specified in the contract as change of the requirements on the Management System. The application of these variations are then documented in the Contract/Project Plan and/or the underlying plans such as Development Plan, Quality Plan and/or Environmental Plan. It is emphasized that the requirements in this document are complementary (not alternative) to contractual and applicable law and regulatory requirements. Some demands in this manual will be defined as “if applicable”, this means that this might not apply to all. If a Supplier believes they have a reason for dispensation, the ordinary contact should be contacted to get a written approval.

Supplier Quality Conditions and Requirements
Within the defense industry there is a various amount of policies, laws and regulations that must be followed. This manual is created from these requirements and include Saab standards, workmanship standards, legal- and regulatory requirements, and environmental- and social demands. It also includes the Saab policies such as the Quality Policy, Environment Policy, and the Occupational Health and Safety Policy.

Procurement Policy
Saab’s procurement policy serves as a norm for the division’s choice of Suppliers, and contains a number of fundamental principles:
- Competition.
- Long-term relationships with few suppliers.
- Standardization and simplicity.
- Zero defects.
Some of the most important parameters when assessing Suppliers are:
(1) Product Quality (2) Delivery on time (3) Service (4) Price.
Definitions

**Acquirer**
Governmental and/or NATO Organizations, that enter into a contractual relationship with a Supplier, defining the product and quality requirements.

**BCM**
Business Continuity Management

**CoC**
Certificate of Conformance. A document, signed by the Supplier, which states that the product conforms to contractual requirements.

**Cpk**
Capability index

**DAP**
Delivered At Place.

**DFARS**
Department of Defense Federal Acquisition Regulation Supplement

**DoD**
Department of Defense.

**E&C**
Ethics and Compliance, shall ensure that Saab has adequate internal rules and procedures, and a well-adapted and efficient organization, in place to meet applicable legal requirements and stakeholders expectations regarding business ethics with a particular focus on anti-corruption and bribery, data privacy and whistle-blowing.

**FAI**
First Article Inspection.

**FAR**
Federal Acquisition Regulation

**GQAR**
Government Quality Assurance Representatives are the Personnel with responsibility for Government Quality Assurance (GQA), acting on behalf of the Acquirer.

**Intermediaries**
Market business partners and external individuals such as advisors.

**ISP**
Swedish Agency for Non-Proliferation and Export Controls.

**PRR**
Production Readiness Review.

**QMS**
Quality Management System.

**SCAR**
Supplier Corrective Action Request.

**SQA**
Supplier Quality Assurance.

Standards and regulations

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Order of precedence
If this document and its requirements are not followed or if there is any inconsistency, the Supplier shall seek clarification in writing from Saab. However as previously mentioned, if there are inconsistencies between contract requirements and this document, or between local laws, the contract and legal requirements prevail. Failure to meet the requirements in this manual may result in the loss of Saab business. More information can be found in the supplier portal: https://saabgroup.com/about-company/saab-supplier-portal/
1. GENERAL DEMANDS
Saab understands that not all Suppliers have the resources or the knowledge to be ISO 9001 certified, however it is something that Saab expects all Suppliers to strive for. Therefore Saab wants to work together with the Suppliers and ensure that there is no miscommunication between the parties but also to provide support when needed.

2. EXPECTATIONS CONCERNING PROCESS / PRODUCT QUALITY
2.1 Early warnings
When the Supplier suspects that there might be problems in a product, in the production line or other quality related issue, the Supplier must contact Saab and make Saab aware of the status. It is better to alert one time too many.

2.2 Continuous improvements
In order to achieve zero defects, the Suppliers must work with their internal quality in an offensive way, adapting continuous improvements.

- As soon as a deviation or a negative trend occurs, a root cause analysis shall be performed, suggestively by using tools such as 5why and/or an Ishikawadiagram. It is important to find the actual reason to the deviation and not only put it as an operational error. To capture problems before they occur it is recommended to use control charts to predict trends and deviations.
- Internal audits, such as product and process audits, is a great way to not only verify the processes and increase quality, but also to search for areas of improvement. The Supplier is expected to monitor, measure and continuously improve all processes, suggestively according to the PDCA-cycle, to assure a high level of safeguards against disturbances and that the quality remains high. The corrective actions performed shall be verified and the efficiency of them established.
- For new products, a few more steps needs to be taken into the evaluation process. The Suppliers are expected to critically examine the requirements presented in the technical documentation and apply their know-how, by proposing alternative ways that can either simplify/improve the product. Saab also expects the supplies to call attention to cost-critical requirements. Finally, it is to be confirmed that the requirements are:
  - Understood.
  - Complete
  - Possible to achieve and capable.
  - Measurable with a capable measurement system.

2.3 Reliability and Validity
- Saab expects the Suppliers to apply procedures to ensure/verify that the quality of purchased products conforms to the established technical documentation. This should be performed by qualified personnel with recorded auditing competence according to the latest version of ISO 19011.
- The compliance of the product with applicable technical documentation shall be verified by appropriate inspections performed by the Supplier. The scope of these inspections, which shall be stated in the Supplier’s verification plan, shall be determined by the Supplier with regard to:
  - The reliability of the manufacturing process.
  - Results from the tests.
  - Process capability and process monitoring.


- Results from product audits.
- Risk analysis,

- To ensure the reliability, operation, and capability of the manufacturing process, there must be procedures for preventive maintenance and preferably predictive. This maintenance system should be documented.
- The Suppliers are expected to have documented methods and KPIs to monitor and analyze trends and levels of product quality, delivery reliability and customer satisfaction. Minimum of methods are claims including response time, delivery on time, yield, and wastage.
- The Suppliers are expected to choose sub-Suppliers with the necessary competence and quality level in order to steer and monitor normal and critical processes in a way that secure fulfilment of requirements from the beginning. The Suppliers should also have documented processes on how they chose their sub-Suppliers. When the Suppliers buy from their sub-Suppliers there has to be well specified and documented product requirements.

2.4 Product Change

Parties shall actively and continually strive to optimize the manufacturing of the Product from a cost, quality and time aspect. This shall preferably be done as early as possible during the implementation phase but changes can also be introduced and implemented in later phases.

2.5 Measured Product Quality

The Supplier must have suitable internal quality control on their Products. They must also ensure that the Sub-Suppliers perform suitable controls. This especially applies to Special Processes where it might be hard to measure the quality like in e.g. the surface treatment processes.

2.6 Saab tools

Tools such as molds, fixtures, special tools, manufacturing schedule and so on, which has been developed by the Supplier and funded by Saab, is the property of Saab (unless otherwise is agreed) and should be returned on request. These tools shall only be used for the manufacture of products for the Saab. The Supplier should keep a documented list on the tools that belongs to Saab. And when the tools are in the possession of a Supplier or a sub-supplier, they should be marked with “Property of Saab” or equivalent, cared for (such as calibration) and insured by the Supplier/sub-supplier.

3. DOCUMENTATION

The Supplier must be able to provide the documents requested in the contracts/orders at delivery. If not provided, the delivery is not considered as complete and the Supplier must provide the additional documentation.

3.1 Documentation from Supplier at delivery

The supplier must provide documentation requested by Saab in the contract/order. Examples of such documentation is material certification, root cause analysis, corrective action, surface treatment certification, measurement protocol, and CoC.

- The CoC should validate that the products are in conformity with documented demands and produced according to the QMS. We recommend the usage of the
document ISO 17050, however, we also provide an example of an approved CoC in appendix 1. The CoC should identify the article and consist of at least:
- A signature from an authorized quality manager.
- Name, article number, revision, quantity and serial/batch number (if applicable).
- A unique certificate number.
- Reference to Saab's purchase order, order row, delivery and packaging bill.
- Confirmation that the article is in conformance with the requirements from the drawings, the specifications and the purchase order, and have been quality tested (where applicable).
- If applicable, information about lifetime restrictions and/or storage time.
- If applicable, any information that identifies particular data or limitations, such as deviation reports/waivers/concessions, shortages, outstanding work etc.
- If applicable:
  - A test report shall be available upon request from Saab and if agreed enclosed to the shipment.
  - A (sampling) certification according to the latest version of EN 10204 must be included in the delivery to Saab.
  - A measuring record must be included in the delivery to Saab.

3.2 Internal Quality documentation
- The Supplier shall maintain a QMS that must meet NATO’s requirements for quality AQAP-2110 as well as the requirements of the latest version of ISO 9001 or corresponding. A description of the QMS shall on request be sent to Saab and should include detailed documents and work instructions, including procedures for managing sub-contractors
- In cases where there is an agreement that a Quality Plan (QP) shall be submitted prior to the start of the work, it should suggestively be according to the latest version of ISO 10005, which addresses the contractual requirements. The QP shall:
  - Be a clearly identified discrete document or part of another document that is prepared under the contract;
  - Describe and document the quality management system requirements "contract-specific" necessary to satisfy the contract requirements (making reference, where applicable, to the "company-wide" quality management system);
  - Describe and document the planning of the product realization in terms of quality requirements for the product, needed resources, required control activities (verification, validation, monitoring, inspection, testing), and acceptance criteria. This shall include specific arrangements and communication requirements where work is to be conducted at locations external to the Suppliers premises;
  - Document, and maintain traceability of requirements from the planning process by including a requirement and solution compliance matrix, justifying fulfillment of all contractual requirements (making reference where applicable).

3.2.1 Supply Chain Visibility
Saab and representatives from end customer have the rights to visit the Supplier to audit the QMS, including but not limited to the following information:
- Manufacturing lead time of tiered Suppliers.
- Manufacturing location of tiered Suppliers.
- Transportation lead time between the tiers.
- Communication process between the tiers.
3.3 Part Quality Assurance
The Supplier shall have quality assurance processes/routines in place for material sourcing, preparation, production and verification of new or changed parts/products, covering:

- Review of Technical Documentation.
- Process flow, manufacturing plan.
- Design & Process risk analysis.
- Control/Inspection.
- Tooling, gauges, equipment.
- Preventive maintenance.
- Calibration of measuring equipment.
- Operator instructions, control instructions.
- 2nd tier material.
- Packaging instruction.
- First Article Inspection (FAI).
- Training programs/Competence plan.
- Handling, storage.
- Traceability.
  - The Supplier must have routines for traceability of materials so potential flaws that are discovered later can be traced back to its origin.

3.4 Classification of Properties
The purpose of the classification system is to establish that the Suppliers perform documented quality controls at the production and assembly of new- or developed products. The requirements have been established in order to achieve common interpretation of actions needed according to the different product property classes. More detail about the classifications can be found in appendix 2 and the full description in the document Classification of Properties.

3.5 Interpretation of Saab Documents
In appendix 3 you can see an explanation of how to interpret Saab’s documentation concerning terms like revision and Issue. The purpose of the appendix is to facilitate the interpretation of Saab documents and avoid miscommunication.

3.6 Other Documentation
All agreements with intermediaries shall be in writing and must include:

- An anti-bribery and corruption undertaking.
  - An immediate termination right should the Intermediary be found to be in breach of its anti-bribery and corruption undertaking.
- Saab expects the Supplier to have a BCM plan in place, in alignment with the latest version of ISO 22301.
- It is strictly prohibited to send Export Controlled documentation (such as drawings) online. For sending documentation, XCT should be used (unless otherwise agreed) which is a solution for exporting and importing controlled information. Sending export controlled documentation may result in legal action. If you are unsure about the restrictions, please contact your company contact.
- All documentation should be stored according to Saab requirements.
4. ORDER AND DELIVERY

4.1 Purchase Order
Saab will submit a Purchase Order for the purchase of Products. The Purchase Order will be provided via encrypted files (XCT) or as agreed between the Parties to protect the property of Saab and whomever that might be affected. Conditions not specified in the Purchase Order shall be governed according to Saab’s General Conditions of Purchase.

4.2 Purchase Order Acknowledgment
The purchase order acknowledgment shall preferably be done by returning the formally signed purchase order from Saab via encrypted files (XCT) or as agreed, to the point of contact. If the Supplier neither has confirmed nor rejected the Purchase Order within the agreed time period, the Supplier is deemed to have accepted the Purchase Order, and thereby these general conditions of purchase. Saab’s purchase order shall be used unless otherwise agreed. If Saab’s purchase order is not used for purchase order acknowledgment, the Supplier must still provide corresponding information. If the Purchase Order cannot be acknowledged as is, the acknowledgment shall also contain information about any deviations from the Purchase Order. In no event, however, shall the Supplier refer to any other terms and conditions than the agreement.

4.3 Deviation, returns and non-conformity
The Supplier is obligated to handle the repair and replacement of returns and claims professionally, and must acknowledge the fact that Saab can be put in severe situation as a consequence of a defective delivery. In the event that products delivered by the Supplier are not accepted by Saab due to a deviation, Saab always has the right to return the products to the Supplier and the supplier shall perform and share the following actions taken:

- The Supplier shall accept and confirm this return within 48 hours after receiving the e-mail and provide Saab with the short term action necessary in order to enable continuous production. The products in production, in store and in transit shall be blocked.
- The Supplier should investigate root-cause for the deviation within 10 days. The results from the root-cause investigation shall be presented in writing to Saab and contain both remediating and preventive actions, with applicable time schedule for implementation.
- The Supplier shall be committed to implement the corrective action, that is based on the root-cause analysis, within 30 calendar days and validate the corrective actions efficiency within 60 days.
- The supplier is responsible for the return costs such as transportation costs.
  Note: at every delivery after a return the Supplier shall provide Saab with the new documentation no matter what the change is such as rework.

4.4 Evaluation of supplier
If a supplier fails to deliver according to agreement at multiple occasions, Saab will demand an action plan on how to improve the process to ensure product and process quality. In some cases, depending on the level of errors, Saab shall have the right to terminate the contract. The Supplier is evaluated in:

- Confirmation time at a return;
- The number of returns;
- Return percentage;
- Number of repeated returns.
4.5 Cancellation of order
Saab may, without giving a reason, cancel orders. This cancellation should be in writing. When canceling an order, the Supplier has the right to claim compensation for the cancellation as well as other potential costs of liquidation. The total compensation to the Supplier should correspond with the original cost and cannot exceed the total price for the purchase. The cancellation should be within 24h and the Supplier should arrange it to minimize costs.

4.6 Price
- The prices are firm and fixed unless otherwise expressly agreed in writing.
- All prices shall be inclusive of all taxes, fees or other charges and shall include all costs associated with suitable packaging and preparation for shipment.

4.7 Terms of payment
- Undisputed invoices shall be paid within 60 calendar days from the date of receipt of the invoice or the delivery of the Product.
- Invoices shall refer to the number of the relevant Purchase Order and item/position/line in the Purchase Order. Invoices not referring to a Purchase Order will not be accepted and consequently not paid.

4.8 Export Control
Saab relies on the Suppliers to provide Saab with export restriction information about the hardware, software, information and services. Information such as delays in Export Control Licenses, must be communicated to Saab as soon as the Supplier is aware of the problem. This is for Saab to be able to plan and control its internal processes to assure quality.

4.10 Offsets
Offset business is an agreement where the buyer in the contract includes the condition that the seller has to perform activities that benefits the buyer/Nation. The responsibility for these activities are sometimes shared between Saab and its Suppliers which shall be defined in the contract/agreement.

5. DELIVERY PERFORMANCE
For Saab it is important to deliver quality products to its customers on time. This means that a delay in the Supply Chain could potentially affect the relationship between Saab and its customers. Therefore the Suppliers must deliver the right product, at the right time with the right quality. But to prepare Saab if the case is not so, Saab requires the information as soon as possible to find a common solution.

5.1 Notification and Mitigation
- If the Supplier anticipates or has reasonable cause to believe that a delay in delivery may occur, the Supplier shall immediately notify Saab in writing stating the cause of the delay and the Supplier’s best estimate of when delivery can be made. Such notice shall not limit the Supplier’s liability for the delay.
- In the event of any delay in the delivery the Supplier shall, in addition to submitting a notification, use all efforts to mitigate the delay in delivery and shall ship via expedited routing.
- Upon a delay in delivery, Saab shall be entitled to liquidated damages to be payable according to agreement.
• The liquidated damages shall become due at Saab’s demand in writing. The Supplier’s payment of liquidated damages shall not relieve the Supplier from the obligation to deliver the Products.

5.2 Termination
Saab shall be entitled to terminate the Agreement or any part thereof with immediate effect by notice in writing to the Supplier, if it is clear from the circumstances that a delay will occur which would entitle Saab to maximum liquidated damages.

5.3 Partial deliveries
Partial deliveries are not allowed and any deviation needs to be approved by Saab prior to delivery. The Supplier shall promptly inform Saab when it suspects or has knowledge of such deviation.

5.4 Delivery
The delivery should be performed according to agreed terms of delivery.

5.5 On-Time Delivery
A delivery shall be considered on-time if it has been handed over to the freight forwarder in accordance with the agreed delivery date set out in the Purchase Order.

5.6 Late Deliveries
Suppliers exhibiting poor performance may be required to submit corrective and preventive action plans and shall not refuse such requests.

5.7 Deviations
Deviations from production-process specifications must be presented to Saab quality represent before delivery. The delivery cannot happen before the deviation is approved by Saab. The deviation shall be handed a deviation number in the order specification, and the articles with a deviation shall at delivery be clearly marked with a reference to the stated deviation number as well as on the CoC.

5.8 Counterfeit parts
“Counterfeit Parts” means materiel whose origin, age, composition, configuration, certification status etc. has been falsely represented by:
(a) Misleading marking of the materiel, labeling or packaging;
(b) Misleading documentation;
(c) Any other means, including failing to disclose information.
The Supplier shall not deliver counterfeit/suspected counterfeit parts to Saab. The Suppliers shall only purchase products to be delivered to Saab directly from the Original Component Manufacturer, Original Equipment Manufacturer, or through an authorized distributor chain. Parts shall not be acquired from independent distributors/brokers unless approved in advance in writing by Saab.

5.9 Warranty
The Supplier shall remedy any defect in the Product resulting from faulty design, material or workmanship or any nonconformity of the Product to any agreed specification during a warranty period of 24 months starting from the delivery of the respective Product.
6. TRANSPORTATION

6.1 Booking of Transport
All transportation shall be booked and sent according to the transport instruction for respective country.

6.2 Delivery Address
The shipment shall be delivered to the address stipulated in the purchase order unless otherwise agreed between the parties.

6.3 Delivery Notification
- If requested by Saab, the Supplier shall in an agreed electronic format, notify Saab of a shipment. This notification shall, as a minimum, include information on purchase order number, delivered part number(s), quantity, dispatch date and shipment tracking number.
- In case of a DAP delivery, the arrival date should also be included in the delivery notification.

7. PACKAGING

7.1 Packaging
The Supplier shall pack each product to a standard which shall ensure transportation and delivery to Saab without any damage to the product. Some packaging might require special packaging which will be defined in the contract/order. The Supplier shall be responsible for all loss or damages arising out of the failure to meet such packaging requirements.

7.2 Marking of Package and Documentation
Saab expects Suppliers to continuously review packaging methods, packaging and transportation protection so that these factors do not degrade the performance of the product during transport and storage. If several parts are delivered at the same time, they shall be individually packed. Two labels should be attached, one inside and one outwardly. Each package in a shipment shall be properly marked with the information agreed. The Supplier shall also enclose 2 sets of packing lists and Certificates of Conformity (if applicable). One shall be enclosed inside and one shall be attached outside on one of the packages. The packing list shall state the above information in digits (human readable). The package containing the attached documentation shall be clearly marked and easy to identify.

7.3 Producer responsibility
The Supplier shall provide information on whether the product is covered by any form of producer responsibility or other provisions that involve special handling on disposal. This may mean that the product shall be returned to the Supplier for end of life treatment.

7.4 Material
Materials used for packaging shall be environmental friendly and possible to recycle. If wooden boxes are used, the requirements in ISPM 15 shall be fulfilled.

8. PRODUCT AND PROCESS VERIFICATION
It is highly important for Saab that the Suppliers work both work proactively and reactively to secure their processes to minimize the risk of errors.
8.1 Audits
Saab stipulates the right to perform supplier audits both before signing a contract and during the time of the contract. Deviations shall be treated by using quality tools such as Root-cause Analysis and/or 5Why. Then a corrective action shall be performed and verified.

8.2 PRR
In combination with the start of production and before delivery, Saab or a representative have the right to monitor the manufacturers/Suppliers production process to establish that the process is qualified for production. The Supplier should inform Saab when a PRR can be performed.

8.3 FAI
FAI should be executed (if applicable) according to the latest version of EN 9102, or corresponding equal routine. Every new product, edition of a product, or change in the manufacturing process requires a new FAI that covers the changes. The Suppliers should then at least 10 working days before the FAI notice Saab about the inspection if they want to participate. The products where a FAI has been performed shall be labeled or marked in a clear way. A reference to the FAI report should be on the CoC.

8.4 Change control
If the Supplier makes a change in location, in a process or in a product that relates to Saab’s products, a change control must be made and presented to ordinary contact at Saab that in turn must give a written approval. The fact that Saab has approved the change does not absolve the Supplier from responsibility for the change.

8.5 KPI
The Supplier shall regularly follow up its delivery performance and provide this information as agreed. Additional key performance indicator agreed by the parties shall be jointly reviewed during program review meetings and will perform base for definition of targets and implementation of continuous improvement plans.

9. SUPPLIER CODE OF CONDUCT
For Saab, responsibility for people, the society and the environment throughout the full supply chain is critical in order to create a sustainable work. Since Saab sees its Suppliers and their sub-tiers as an extension of their own operation, the Suppliers need to ensure that they also take responsibility in these questions and comply with all applicable governmental regulations. Therefore Saab expects the Suppliers to establish their own codes of conduct and to flow down these standards to all persons and entities supplying goods or services to Saab.

9.1 Compliance with local environmental, health and safety laws
The Suppliers must comply with local, state and federal laws and regulations in the country of origin. This applies to all operations in the organization and at no time shall any Saab employee be exposed to unsafe conditions or hazardous materials as a result from the Supplier shipment. Hazardous materials needs to be marked at delivery.
9.2 Compliance with Saab’s environmental requirements
The Suppliers must follow Saab’s environmental requirements as well as have an environmental certification in accordance to the latest version of ISO 14001 (or corresponding). If requested, the Supplier must provide any documentation (relating the product) that Saab requests and requires during the assessment. This includes detailed documents and work instructions, including procedures for managing sub-contractors, specific to production of material for Saab. Only chemicals from the approved document list SaabChem (GMS-0110) may be used in products, and the regulations of RoHS and Reach must be followed.

9.3 Health Hazardous Materials Report
At delivery, the Supplier shall deliver a Material Declaration or an Environmental and Health Hazardous Materials Report. For chemical products the Supplier shall send Safety Data Sheets (SDS). The Supplier shall also upon Saab’s request provide an Environmental Product Declaration of the Products.

9.4 Labor and Non-Discrimination
Suppliers may not employ workers below minimum legal age in accordance with federal laws in the origin of country. The working conditions such as wages and hours should also follow federal laws in the origin of country. Suppliers shall not use or practice any type of forced labor and may not under any circumstances discriminate against race, color, sex, religion or any other defining characteristics.

9.5 Conflict Minerals
Saab expects the Supplier, where applicable, to exercise reasonable due diligence concerning the use of conflict minerals and the source of these minerals and to respond in a timely manner to Saab’s request for information on these activities and findings.

9.6 Safety and Security
The Suppliers are responsible for providing a safe working environment for the employees. To do this, continuous risk assessments must be made together with education to prevent accidents in the work place and to encourage a safe work environment. In loud environments or where there is any risk of bodily damage, the employees must be provided with suitable gear such as protective glasses, hearing protection, steel toe-caps etc. The sites should also provide suitable equipment such as fire detectors, fire cells, fire extinguishers, sprinkler systems and so on.

9.7 Ethics
If there is any proof of corruption, bribes, and improper advantages or similar, Saab will evaluate the situation and potentially terminate the relationship. Saab has a zero tolerance for corruption.

9.8 Disputes and applicable law
- Any dispute controversy or claim arising out of, or in connection with, the Agreement, or the breach, termination or invalidity thereof, shall be finally settled by arbitration in accordance with the Rules of the Arbitration Institute of the Stockholm Chamber of Commerce. All arbitrators shall be appointed by the institute. The seat of arbitration shall be Stockholm, Sweden. The language to be used in the arbitration proceedings shall be English. The Parties undertake and agree that all arbitral proceedings will be kept strictly confidential.
The Agreement shall be governed by and construed in accordance with the laws of Sweden, excluding its conflict of law principles providing for the application of the laws of any other jurisdiction.

9.9 No waiver
A party’s waiver of any of its rights under the Agreement must be in writing and duly executed by it. No single or partial waiver of any such right or remedy shall preclude any other or further exercise of that or any other such right or remedy.

9.10 Confidentiality
Saab expects the Supplier to protect Saab’s information by implementing applicable controls in alignment with the latest version of the international standard ISO/IEC 27001, unless otherwise agreed in writing. Each party shall protect Proprietary Information received from the other party with the same degree of care that it exercises with respect to its own Proprietary Information. This will also be agreed in a Non-Disclosure agreement.

9.11 Supplier Approvals
The products delivered must, in addition to the Specification, meet all requirements imposed by any law or regulation applicable to the production, use, repair, maintenance, transport, disposal and/or sale of the products.

To read more about the Intellectual Property Rights, Liability and Indemnity, and Force Majeure go to the General Purchasing Documentation in Saab’s Supplier portal.
Appendix 1. Example of a CoC

Place for company name/logo

LEVERANSCERTIFIKAT
CERTIFICATE OF CONFORMITY

 Utfördare issued by: XXX
 Typ Dept: XXX
 Telefon Telephone: XXX
 Datum Date: 20XX-XX-XX
 Dokumentnummer Document ID: XXX

Kund Customer: SAAB DYNAMICS
Enl ordernummer Your order number: Värt ordernummer
Omr referens Our order number:

Godsmottagare Shipped to (Consignee):

Härmed intygas att - med undantag för angivna avvikelser - den produkt/tjänst som anges nedan i alla avseenden överensstämmer med i avtalet/beställningen angivet underlag och att produkten/ tjänsten kvalitetskontrollerats och provats i enlighet med angivna villkor och fordringar.

20XX-XX-XX
Datum, Ort Date, Place
Namneckning Signature
Namnforhållande Clarification of signature

För-nummer enligt avtal/bestätt Contract item no.

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Bifogade dokument Enclosed documents

- Materialcertifikat Certificate of Material test
- Ytbehandlingsintyg Certificate of Surface treatment
- Måttnotprotokoll / Utfallsprov Measuring record/ sample of test
- Värmeteckningsintyg Certificate of Heat treatment
- Annat Other
- Avvikelserapport Deviation report

Anmärkning Remark

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Appendix 2. Classification of properties - Ground Combat

The actual classes of the product properties are defined by the Drawing set and listed in the Critical Item List. Every requirement on drawings has a classification. Class 1-3 is marked with [1] – [3] respectively. No marking at all means Class 4. In the same way every requirement in Technical Specifications (PATS) are marked. A [D] means mandatory documentation of results, (valid for Class 2-4).

Class 1 shall apply to Safety-Critical properties. In the production of units, the process shall be controlled in accordance with the corrected Cpk of at least 2.

- Class 2 shall apply to Function-Critical properties (function-preventive failures) or Safety-related properties (major failures). In the production of units the process shall be controlled in accordance with the corrected Cpk of at least 1.67.
- Class 3 shall apply to Function-affecting properties (failures degrading function) or Production preventing properties (minor failures). When producing units the process shall be controlled in accordance with the corrected Cpk of at least 1.33.
- Class 4 shall apply to other required properties. The manufacturing process shall be designed in such a way that normal variations can be expected to lie within specified tolerances. Spot checks should be carried out to check that no abnormal deviations occur. A cross-check on correct interpretation of these requirements takes place at the initial sample test. Class 4 demands no material certificate, regular CoC is sufficient as certificate for the material.

In cases where process control as indicated above is not applicable or possible to perform, 100%-inspection of the properties shall be used. This shall be performed:

**Class 1**

- With an automatic inspection equipment to check the property. In an automatic test equipment there shall be no human judgment.
- Or by at least two separately performed 100% inspections, performed by someone other than the manufacture operator. The inspections shall be performed on the actual unit or in subsequent stages of the assembled unit.
- Or by at least one effective failure-detection at a subsequent process stage (e.g. where it is not possible to further assemble).

**Class 2**

- By one 100% inspection, not performed by the operator. The inspection shall be performed on the unit or in subsequent stages of the assembled unit
- Or in accordance with class 1.

**Class 3**

In the cases when process control in accordance with above is not applicable or not possible to perform, a so-called sample inspection of the properties shall be used. This shall be performed:

- By at least one sample inspection.
- Or in accordance with class 2

For deviations, special cases and failure corrective actions, see the Classification of properties document.
Explanation of Cpk and Detection Limits

Cpk measures how consistent you are to around your average performance and how close you are to your target. The higher the Cpk index is, the less likely it is that any item will be outside the specs. The Cpk is calculated by:

\[
Cpk = \min \left( \frac{USL - \text{mean}}{3 \times \text{std. Dev}}, \frac{\text{Mean} - LSL}{3 \times \text{std. Dev}} \right)
\]

USL = Upper Specification limit
LSL = Lower Specification limit

The Upper/Lower Specification limits (represented by the red lines in figure 1) are set by Saab (1.33, 1.67, 2.0) the limits are the values between which products or services should operate. Due to the high risk with a faulty class 1 product they have a narrower interval than the Class 3 products.

To find more quality related information visit: https://www.aiag.org/quality/quality-road-map
## Changes from Previous Versions

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