

The challenges of Strategic Risk Management

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A Thesis presented for the degree of
Bachelor of Science



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June 2018

Abstract

Managing risk has always been a vital ingredient to successful companies and can be seen as a competitive advantage if managed right. Of the various types of risks, strategic risks have historically caused 86 percent of companies' significant losses in market value, while only 6 percent of risk management auditor time are spent on that type of risk. This relationship stresses the importance of developing effective Strategic Risk Management (SRM), an activity which can be defined as assessment and management of risks and uncertainties with external characterization relatively a company - an activity not many companies manage successfully. This thesis aims to identify main factors which drive the complexity of applying risk management best practice tools to a strategic risk.

The research applied a case study design at Saab Group to provide an example of a strategic risk assessment and to analyze the process' outcome. The risk assessment process that was created and performed in the case study can be divided into the following four sections: (1) understand the process that caused the strategic risk, (2) Risk Workshop, (3) Bowtie Model and (4) Heat Map & Papa Model. The first step was done as an input to the Bowtie Model and background to the Risk Workshop. The results from each step was then analyzed to understand what factors driving the complexity of a strategic risk.

The factors driving the complexity of a strategic risk consist of three main traits. First, the uncertainty of a strategic risk event's outcome makes reliable evaluation challenging. Second, the external origin of the strategic risk makes it more difficult to quantify risk impact and probability of the risk's occurrence. Third, the opportunity potential that was found in a strategic risk was not explored sufficiently, nor documented by the industry best practices for risk management, making risk assessment more unbalanced.

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Glossaries

List of Abbreviations

CEPT European Conference of Postal and Telecommunications Administrations

ECC Electronic Communications Committee

ERM Enterprise Risk Management

ETSI European Telecommunications Standardization Institute

ITU International Telecommunication Union

PTS Swedish Post and Telecom Authority

RSC Radio Spectrum Committee

RSPG Radio Spectrum Policy Group

SRM Strategic Risk Management

TRM Traditional Risk Management

WRC World Radiocommunication Conference

1. Introduction

The introduction of the bachelor thesis will provide the reader with the necessary prerequisites to the research. In this chapter, the reader covers background, problem analysis, research aim, research questions and research delimitations.

1.1 Background

Managing risk has always been a vital ingredient to successful companies and can be seen as a competitive advantage if managed right [1, 2]. However, as the Traditional Risk Management (TRM) often refers to insurance, financial and legal risks, pressure for an enhanced risk management which explicitly incorporate strategic risks on a company-wide level has arisen [3, 4].

One industry that has been practicing TRM for some time but has begun to incorporate risk management across the entire enterprise is high-tech companies [4]. There are three main reasons to why high-tech companies have shown increased interest in developing an enterprise wide approach to risk management. Firstly, as the high-tech industry is characterized by slower growth and global competition, managing costs has moved to a central managerial position. Hence, avoiding to maintain traditional risk silos in insurance, finance, strategy or operations, high-tech companies focus instead on minimizing overall risk from a holistic company level. Secondly, technological product life cycles have progressively been shrunk, leading to greater exposure to technological strategic risks. Thirdly, global events and corporate scandals have increased awareness among high-tech companies on new risks to be managed [4]. In addition, along with new technological innovations and

more rapid-paced business landscapes, executives experience declining confidence that business objects and plans will be met as expected [2].

Furthermore, the executive director of the Committee of Chief Risk Officers explains how and why incorporating strategic risks into a broader Enterprise Risk Management (ERM) has been proven to add value to companies: *"... Ten years ago, risk management was mainly about the use of swaps and options to hedge interest rates and commodity prices. Back then, risk management was thought of as a pretty much decentralized, or compartmentalized, activity that could help the firm mainly by making modest contributions to the profit and loss statement. But the purview of today's risk manager is much broader; it encompasses all aspects of the corporation, including investment and operating decisions as well as financing – anything that affects the level and variability of cash flows going forward. It is about ensuring the company's access to capital and its ability to carry out its strategic plan – and, in this sense, it is a critical part of the business model"* [5, p.3]. The quote clearly expresses the recent realization of risk management's importance to companies' performance. It indicates that risk management is fundamentally important and that the historical experience of the subject is very limited, implying that research and new insights within the field can be utterly valuable.

Today, ERM, and specifically strategic risks are of high concern. In fact, a global study by Deloitte says that 54 percentage of major companies fear that innovative, yet disruptive technologies can affect business results and long-term business models. Hastened by social media, mobile trends and big data, strategic risks can strike more quickly today than before and are putting more pressure on companies to manage risks even more effectively [2]. However, the same study by Deloitte shows that 81 percentage of major companies explicitly and actively manage strategic risks. In addition, many companies have shifted their focus from preventing particular strategies to fail, to a broader context on whether risks can affect long-term positioning and performance. In 2013, 94 percentage of the respondent companies claimed that they had changed their approach to Strategic Risk Management (SRM) during the

last three years [2].

1.2 Problem analysis

As the need for adopting a holistic approach to understand enterprise-wide risk increases, management has shown a tendency of confusion and fails to adequately manage risk to gain competitive advantage. This pattern is found in even sophisticated companies where strategic risks are not managed to the benefit of companies. Most companies have no comprehensive mechanism to bring issues related to risk and risk return potential to the board's attention, due to the confusion it causes [6].

Strategic risks tend to be rarer and harder for companies to predict and prepare for, which has led to that most executives spend the majority of their time managing risks with high probability of occurrence instead [7]. Consequently, strategic risks does not get the necessary attention needed for sufficient prevention and mitigation management. Thus, most time that auditors spend on risks are within operating and financial risks, which make up 81 percentage of total time spent. Only 6 percentage of the time auditors spend is on strategic risks. However, despite the low focus on strategic risks, a significant large proportion of loss in market value are caused by strategic risks. In fact, 86 percentage of significant losses in market value are caused by strategic risks, whereas only 11 percentage can be explained by operating and financial risks combined [8]. Although many mature companies have sufficient management capabilities to assess traditional risks related to insurance, finance or operations, not many systematic efforts have been done to address strategic risks that may be of a more serious cause of value destruction [3, 4]. This implies that companies need to shift focus emphasizing more on how to manage risks that are of strategic nature.

In addition, little research has been performed on strategic risks, compared to both operational and financial risks [8, 9]. Hence, there is unbalance between academic research volume regarding TRM and SRM. Since the importance of strategic risks

have been risen by industry [3, 10], it should at least be prioritized with equivalent amount of resources or even more to balance the research field. Ultimately, putting more effort in research on strategic risks should be welcomed by both university and industry representatives.

1.3 Aim

The research aims to identify main factors which drive the complexity of applying risk management best practice tools to a strategic risk.

Since the complexity of assessing strategic risk is considered to be a main reason to the relatively little research resources spent on SRM, the findings can contribute to an understanding of the causes by identifying the key characteristics of strategic risks that drive the complexity. Furthermore, the report includes an example of a strategic risk and its assessment to exemplify the process and show the context from where the findings were derived. The strategic risk, which is described in Chapter 4, belongs to Saab Group and concerns frequency regulation with focus on its implications for the company.

1.4 Research questions

The first research question below refers to the exemplification of a strategic risk in the case study.

- How can a strategic risk be assessed by risk management best practice tools?

Based on this outcome and the experienced risk assessment process, the second research question is answered.

- What challenges drive the complexity of applying risk management best practice tools to strategic risks?

1.5 Delimitations

As the research aim to identify main factors which drive the complexity of applying risk management best practice tools to a strategic risk, the case study process is limited to a target industry and company to make the research process convenient. However, the findings are expected to be valuable for any company dealing with rapid changing market conditions. Since high-tech companies are experiencing particularly rapid changing market conditions [11] combined with a history of practising TRM [4], the research will be limited to study a company within that industry.

2. Theoretical Framework

The concept of SRM is briefly presented in the following sections, with differentiation to the TRM perspective. The theoretical framework also includes industry best practices for assessing risks, to capture a broad theoretical platform for the research to build on.

2.1 Strategic risk management

To understand the concept of SRM, some examples of definitions on strategic risks and SRM are provided.

SRM has been defined as *"... a process for identifying, assessing and managing risks and uncertainties, affected by internal and external events or scenarios, that could inhibit an organization's ability to achieve its strategy and strategic objectives with the ultimate goal of creating and protecting shareholder and stakeholder value. It is a primary component and necessary foundation of Enterprise Risk Management"* [10, p.22]. This definition by Mark Frigo and Richard Anderson imply two aspects of what an strategic risk is: (1) that these risks are affected by both internal and external events and (2) could impact an organization's strategic objectives, which are the core of an organizations strategy and consists of high-level goals, aligned with and supporting its mission [10]. The authors' definition also emphasize that SRM has the purpose of creating and protecting shareholder and stakeholder value, and is a vital component of the broader risk management perspective - ERM. This claim has support from others as well: ERM summarizes risk management as an integrated, comprehensive and strategic system [4, 12] in which SRM is a vital com-

ponent [10]. A common aim for SRM is to eliminate downside risk while attempting to optimize economic return from alternative business initiatives under uncertain market conditions. The ability to successfully manage strategic risks in this way is the essential driver for global competitive advantage [1].

Alternative definitions of strategic risks are also predominantly aligned with the firstly proposed definition above, with minor variations. Committee of European Banking Supervisor defines a strategic risk as *"the current or prospective risk to earnings and capital arising from changes in the business environment and from adverse business decisions, improper implementation of decisions or lack of responsiveness to changes in the business environment"* [13, p.40]. Another definition on strategic risks are made by Slywotzky and Drzik, who mean that a strategic risk is *"the array of external events and trends that can devastate a company's growth trajectory and shareholder value"* [3, p.78]. Again, strategic risks tend to origin from outside the company and pose a serious threat to overall company goals.

2.1.1 The nature of strategic risks

Some risks that are of external nature are beyond company control or influence, and need to be identified and mitigated rather than prevented. Such risks are natural and political disasters and major macroeconomic shifts, in which companies often have little or no ability to prevent the scenario from occurring. Hence, these risks should be addressed with open and explicit risk discussions about the future, which can be difficult. Extensive behavioral and organizational research has shown that individuals have strong cognitive biases that discourage thinking about and discussing risk until it is too late. People tend to be overconfident about forecasts and too narrow in assessments of possible range of outcomes. In addition, companies rely heavily on historical data when estimating a highly uncertain and variable future. This problem is compounded by confirmation bias, which means that there is a tendency to favor information that supports our own position (typically successes) and suppress information that contradicts them (typically failures) [14].

The complexity of managing strategic risks are often caused by lack of reliable statistical data of similar events. This insight is the basis of the concept on emerging risks, where ERM practises are used to assess new types of risks with high uncertainty [15]. Theory on emerging risks suggests that the uncertainty should be evaluated based on scenarios instead of inadequate risk modelling, due to the limited amount of historical data [14, 15]. The scenarios are preferably assessed in relation to business objectives and companies' risk tolerance. Finally, it is emphasized that executive management should be involved in decisions on allocation of resources between the risks. Since emerging risks are continuously in change, the process of observing risk, establishing priorities, and assessing risk should be an iterative activity to enhance adaptability to critical market changes [15].

2.1.2 Key characteristics of a strategic risk

There are many definitions on strategic risks, so for the purpose of this research, a common definition defining key characteristics for a strategic risk is chosen and adopted to fit this study. To draw any conclusions from the theoretical discussions, all aspects defining a strategic risk need to be interpreted together.

The explanation of the source to an strategic risk tend to be more likely from an external setting [13, 3], although the Frigo and Andersson definition says both internal and external [10]. Moreover, all definitions of a strategic risk align more or less on how a strategic risk is harmful, thus unspecified: that it can negatively impact business on a holistic company level [10, 13, 3]. In addition, it was also mentioned that the complexity of managing strategic risks are due to lack of historical data of similar events [14, 15]. Hence, the three main components defining a strategic risk are:

- External origin - most strategic risks tend to come from events or scenarios that is outside an organization's control or influence.
- Negative impact on business goals - Strategic risks must pose some kind of threat to an organization to be considered strategic. In this case, a strategic risk affects mainly holistic company goals.
- Lack of reliable data - A variety of different possible strategic risk scenarios makes it difficult to rely on statistical records or historical data to make future predictions.

2.2 Industry best practices

In this section, best practice tools for risk management are presented. The tools have proven to be beneficial for assessing various types of risks facing companies in a wide range of industries [16, 17]. However, the tools have primarily been used for traditional types of risks [16], resulting in limited aggregate experience when applied to strategic risk.

To assess a risk related to a certain potential event, the Bowtie Model, shown in Figure 2.1, can be used. It deals with balancing the prevention and mitigation capabilities that affect the outcome of the particular event. Prevention efforts are generally more cost-effective than mitigation efforts. Hence, prevention activities should be emphasized when possible. However, if prevention possibilities are poor and the event can have significant impact on objectives, it is prudent to also develop strong mitigation capabilities. Earlier industry practices have successfully used the Bowtie Model to address risks and how to cope with them [16]. However, this research will apply it in a more complex setting dealing with a strategic risk. The nature of a strategic risk should fit the structure of the Bowtie Model due to its holistic approach, and prove to evaluate a strategic risk setting. However, challenges due to the high levels of uncertainty are expected. Previous research experience of the Bowtie Model indicate that it can be challenging to provide sufficiently specific risk

events to facilitate an assessment without varying individual interpretation. The usage of the model can also be very time consuming, resulting in situations where potentially beneficial discussions are limited due to company time constraints [18].

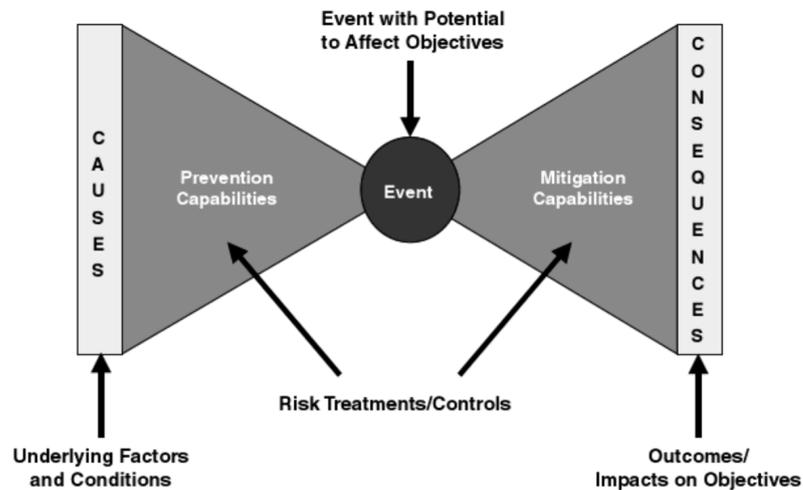


Figure 2.1: Bowtie Model for risk assessment [16, p.291].

An additional tool that can aid the prioritization of prevention and mitigation activities is the Heat Map which compares the level of impact and the likelihood of occurrence. In Figure 2.2, the two factors are compared in a matrix to determine the relative focus on prevention and mitigation. A similar model, named the PAPA Model, was used by LEGO A/S to be used as a basis for prioritization of resources between different strategic risks. LEGO is considered to be in the forefront of successful SRM and with this method, risks are categorized based on the likelihood of the event and the speed of the change if it occurs. Each risk gets labelled with one of the four categories Prepare, Act, Park, or Adapt based on the two characteristics and are treated with resources based on that category [17].

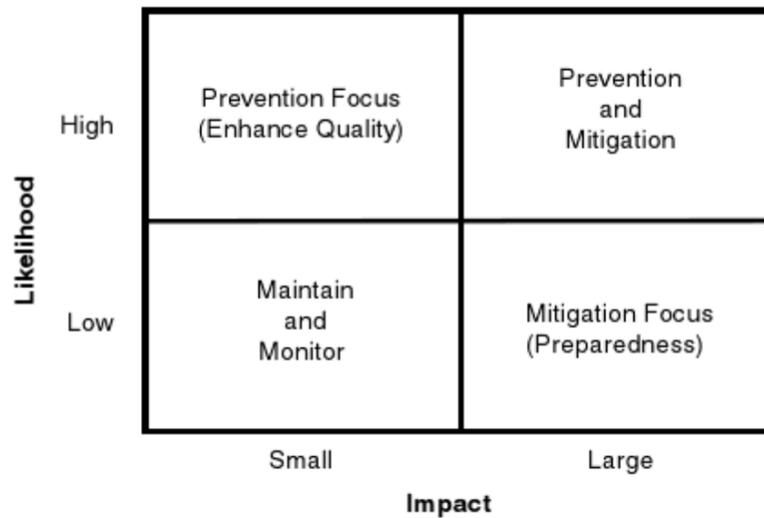


Figure 2.2: Heat Map for risk assessment [16, p.293].

Furthermore, methods to involve many stakeholders to get a holistic view can be very beneficial to achieve a rigorous problem understanding. An example of a method with this purpose is the Risk Workshop. There are carefully documented structures for how to plan, execute and report the results and it is claimed to be especially valuable for complex risks with multiple stakeholders. The agenda for the workshop is decisions, learning, and commitment to action and the outcome is formed to support further activity to manage the particular risk [16].

Although many risk management methods and framework often focus on minimizing the negative risks, change also comes with opportunities. The actors that best succeeds in planning for future change and adapt quickly are likely to gain competitive advantage [1]. Companies can use scenario analysis to evaluate how they might perform given their capabilities and a possible set of future market conditions [14, 16]. After that, they can manage their capabilities in order to enhance likely performance in the different prioritized scenarios. The above mentioned industry best practices for risk management combined with the understanding of what define strategic risks is the basis for the case study where the practices are applied to a strategic risk for identifying challenges and shortcomings of the above tools for risk assessment.

3. Methodology

The research approach was abductive, as the research draws conclusions from a specific case but also compares the findings with existing theory. Moreover, the research strategy was to conduct a single case study since it provided a practical example on how strategic risks can be assessed. The case study is further explained in Chapter 4. It weakened the quality of the research to only study one case, but with time constraints and the depth of such a case study taken into consideration, it was the most efficient strategy.

3.1 Research design

To achieve a proper research design, the authors chose to apply a qualitative design since it is well feasible with abductive approaches and case study strategies. The project followed a general six step method for qualitative research that is described below [19].

1. ***General research questions*** - The first step was to formulate research questions that fulfill the purpose of the research yet are not too specific at this early point of the research process. However, this was an iterative step which was done several times along the research process.
2. ***Selecting relevant site(s) and subjects*** - Previous to data collection, relevant sources of data was identified and understood in the context of the research. The chosen subject to study was a high-tech company which is presented in an own chapter later on. In addition, a suitable strategic risk was identified (which also motivated the choice of company) and relevant persons

at the company was also identified early on.

3. ***Collection of relevant data*** - Given the exploratory nature of the research, primary data from semi-structured interviews, a workshop were the main methods to obtain relevant data. In addition, secondary sources of data, e.g. e-mails and documents was also valuable.
4. ***Interpretation of data*** - Most data came in forms that are open for interpretation. The data from the interviews and workshop were analyzed to be useful in the application of the industry best practices of SRM.
5. ***Conceptual and theoretical work*** - To close the gap between research questions and collected research material, abductive reasoning was performed. It was an iterative process of 5a, 5b and 4.
 - (a) As the research process unfolds, it was necessary to review the original research questions to ensure relevance and to tighter their specification. This was done at least five times.
 - (b) Collection of further data on SRM was done in parallel with to ensure the theoretical framework was fit for evaluation in the light of the research.
6. ***Writing up findings and conclusion*** - Finally, the results from assessing the strategic risk at the case company was presented and a conclusion on what causes challenges in assessment of a strategic risk is presented.

The qualitative research was based on a case study combined with risk management literature. The case study, which is further described in Chapter 4, was used to identify challenges in applying risk management practises for strategic risks, and specifically for this case, in a high-tech company. The project started with confirming that the case study actually consisted of a strategic risk, which was confirmed by discussing the risk with company employees and compare it with the key characteristics of a strategic risk presented in Section 2.1. After that, a literature review of previously identified difficulties in SRM was performed to be used for hypothesizing potential challenges. The expected characteristics and challenges also included possible implications from a high-tech environment and can be found in Chapter 1 and 2.

A risk assessment process for the case study was created based on literature review of industry best practices and two interviews with company representatives with insight in the current risk management process at the case company. The two interviewees came from different departments at the company and the interviews were performed during approximately 40 minutes each with the aim to understand the company's current risk management practices to aid the development of the project's process. The risk assessment process that was created and performed in the case study can be divided into the following four sections: (1) understand the process that caused the strategic risk event, (2) Risk Workshop, (3) Bowtie Model and (4) Heat Map & Papa Model.

3.2 Understanding the process that causes the strategic risk event

The purpose of this step was to apply the findings on the Bowtie Model assessment, and also to structure the Risk Workshop by providing a description of the process leading to the strategic risk. This step included three separate interviews with two researchers at Chalmers University of Technology, specialized in the decision making process leading to the strategic risk and with one key stakeholder that was specialized in the same process. The key stakeholder had extensive expertise about the decision making process leading to the strategic risk. The interviews with researchers were used to get an initial understanding of the decision making process leading to the strategic risk and its involved stakeholders. These interviews were performed in total three times early in the project for approximately 30 minutes each time. The interview with the key stakeholder in the decision making process was held to get information of the process' activities. When the process and its involved stakeholders was understood, data was collected for each decision making authority of the strategic risk event, with focus on how a company can influence the decision outcomes.

3.3 Risk Workshop

A Risk Workshop was performed to evaluate the strategic risk at the case company and then analyze the outcome of how a strategic risk differentiate from a traditional risk and to identify what challenges the process consisted of. Prior to the Risk Workshop, an invitation letter shown in Appendix A was e-mailed to the chosen participants and a Power-Point presentation was prepared to guide the participants during the workshop. The participants that were chosen were all employees at the case company and were chosen due to expertise from different divisions at the company that was thought to be resourceful in the evaluation of the strategic risk. The invited divisions ranged from management functions to product development and sales across multiple business areas. Eight persons out of the twelve invited was able to attend during the workshop, by which one participated through Skype.

Due to the high uncertainty of likely outcomes from the strategic risk event, it was considered necessary to prepare a set of possible risk event scenarios to be used in the workshop. The aim with using scenarios was to assess multiple possible risk outcomes and thereby promote a broad understanding of the risk's variation. Two of the scenarios were developed for possible short term outcomes, specifically within five years. The third scenario was created to illustrate a long term risk outcome with no set time frame. The scenarios were created by the researchers based on the agenda for WRC 2019 [20] and was approved by key company stakeholders of the strategic risk.

As the scenarios was presented, 30 minutes was given to assess each scenario by three measures: (1) impact on business objectives, (2) strength of current mitigants, and (3) probability of occurrence. After a discussion among the participants, each one was asked to vote anonymously for the three risk measures. This process was repeated for all three risk scenarios and the total length of the workshop was 2 hours.

3.3.1 Impact on business objectives

After a scenario was introduced, the participants got the opportunity to discuss the events' possible impact on the company's business goals, consisting of 4 levels on 7 key areas. The key areas and levels were created prior to the workshop based on input from industry best practices [16], the company's current risk management practises and their 2017 annual report [21]. The impact assessment scale matrix used in the workshop is shown in figure 3.1.

Saabs business objectives 2017		Impact on long-term targets			
Category	Long-term targets	Very Low	Low	Medium	High
Market	Be well established in selected markets and have a strong local presence.	Strategy execution not, or only temporarily affected. Strategy achievement not affected.	Strategy execution temporarily disrupted or delayed without affecting strategy achievement.	Strategy execution affected and strategy achievement uncertain.	Strategy execution critically interrupted over a long period of time and strategy achievement highly uncertain.
	Organic sales growth will average 5 % over a business cycle.	No effect on organic sales growth over a business cycle.	Slightly negative effect on organic sales over a business cycle.	Moderate negative effect on organic sales over a business cycle.	Critical negative effect on organic sales over a business cycle.
Performance	The operating margin (EBIT) will average at least 10 per cent over a business cycle.	EBIT loss less than 1 % of annual EBIT.	EBIT loss between 1-4 % of annual EBIT.	EBIT loss between 4-8 % of annual EBIT.	EBIT loss more than 8 % of annual EBIT.
	Equity/assets ratio will exceed 30 % over a business cycle.	No effect on Equity/Assets ratio over a business cycle.	Slightly negative effect on Equity/Assets ratio over a business cycle.	Moderate negative effect on Equity/Assets ratio over a business cycle.	Critical negative effect on Equity/Assets ratio over a business cycle.
	Reduce environmental impact.	No change in target reduction rate of environmental impact.	No reduction in environmental impact or slightly increased environmental impact.	Moderate increase in environmental impact.	Severe increase in environmental impact.
Innovation	Be an industry leader in innovation.	No negative impact on innovative capabilities.	Some execution delays and disruptions but does not affect innovative achievements.	Innovation execution affected and innovative achievements uncertain.	Innovative execution critically interrupted and innovative achievements highly uncertain.
	Have a product portfolio consisting of technologically leading solutions and products adapted to the market's needs.	No negative impact on product portfolio.	Product portfolio execution slightly affected but maintained product competitiveness.	Product portfolio execution affected and might have a negative effect on product competitiveness.	Product portfolio execution critically affected and likely to have negative effect on product competitiveness.

Figure 3.1: Impact assessment scale matrix

3.3.2 Strength of current mitigants

After assessing impact on business objectives, the strength of current mitigants were evaluated. The scale shown in figure 3.2 was used.

Score	Rating	Description
5	Full mitigants; prescriptive; senior mgmt/CEO oversight	Full controls established (see Full mitigants below), Plus: <ul style="list-style-type: none"> <input type="checkbox"/> Objectives, policies, plans, and measures all formally approved by senior management/CEO and clearly documented <input type="checkbox"/> Authorities, responsibilities, and accountabilities tightly defined <input type="checkbox"/> Formal coordination of decisions of different parts of the organization <input type="checkbox"/> Prescriptive/detailed procedures exist <input type="checkbox"/> Close, frequent monitoring of performance <input type="checkbox"/> Overall controls are subject to formal and/or independent review
4	Full mitigants	All elements fully implemented and complete
3	Substantial mitigants	Only one or two elements are missing/incomplete
2	Partial mitigants	A significant number of missing/incomplete elements
1	Few mitigants	Almost no elements in place

- Business objectives communicated to all levels
- Policies established and communicated so that people understand expectations
- Plans have been established and communicated
- Measurable performance targets set
- Authorities, responsibilities, and accountabilities established
- People have the necessary knowledge and skills
- People have the necessary resources and tools, including appropriate computer systems
- Adequate, timely communication/coordination to allow people to perform their responsibilities
- Control activities such as procedures in place and appropriately scaled to risk
- Performance is monitored against targets; assumptions are challenged periodically
- Follow-up to ensure effective change
- Overall control is periodically assessed
- Residual risks accepted on a cost-benefit basis

Figure 3.2: Scale, strength of mitigants [16, p.163].

The participants were allowed to discuss the relevant mitigants within the organization before voting individually and anonymously.

3.3.3 Probability of occurrence

Finally, the probability of occurrence was assessed based on the knowledge within the group, including the researcher who could aid in explaining the decision making process behind the strategic risk. The alternatives consisted of the five levels listed below.

1. Remote, less than 5 % probability
2. Unlikely, 5-25 % probability
3. Medium, 25-65 % probability
4. Likely, 65-95 % probability
5. Very Likely, more than 95 % probability

3.4 Applying industry best practices

The Bowtie Model was used to compare its compatibility to evaluate a strategic risk to find out how an assessment would differ from a traditional risk setting. Based on the gained understanding of the decision making process and the outcomes from the Risk Workshop, the Bowtie Model was used to connect the results and to compare action alternatives. When analyzing the prevention capabilities' side of the model, the different decision making authorities and possible alternatives for a company to influence was evaluated. For the mitigation capabilities' side of the model, an interview was performed with the main stakeholder of the risk at the case company, discussing possible strategic actions during 30 minutes.

To further compile the results, a Heat Map and an assessment similar to the PAPA Model was performed. The Heat Map visualized each business goal's impact from the three scenarios as well as the likelihood of occurrence for the scenarios. The

variant of the PAPA Model was used to provide a recommendation for further actions to the case company, to respond on the strategic risk.

During the risk assessment, the process was studied carefully to identify potential difficulties due to the strategic nature of the risk. The process observation also included testing the set hypothesizes of challenges from Chapter 2 to enable findings showing whether expected difficulties were confirmed. The findings from the risk assessment are presented in Chapter 5 and the difficulties and confirmation of hypothesizes are discussed in Chapter 6.

3.5 Quality of research

The research quality is assessed by the four concepts confirmability, dependability, transferability, and credibility. Confirmability includes mitigation of bias in the research [22]. By involving both researchers in all significant progresses keeping frequent contact with supervisors at both the case company and the University of Gothenburg, space for individual bias was limited. Dependability concerns how likely it is that a recreated project would achieve similar results [23, 24]. The research process provides a transparent and carefully described methodology of the steps which would increase the dependability. However, other choices of risk assessment frameworks and business settings could affect the likelihood of similar results.

Transferability refers to the possibility to make general conclusions based on the findings [25]. The research contributes to a general understanding of how to assess a strategic risk and its challenges. However, as the study use only one strategic risk, and identifying the challenges might cause context specific limitations which limits the transferability. In addition, the chosen industry best practices may not be the main methods for risk management for all companies within high tech. This also weakens the transferability of the study. However, a strategic risk is also generally defined, as done in the previous chapter. Hence, the conclusions drawn from this study should be fit to other cases as well. Finally, credibility includes whether the

content of the report is likely to be correct and trustworthy [26]. The used references are predominantly well cited by other research literature and are often published in credible journals. Information from the case company is often confirmed from multiple sources and although some knowledge is received directly from individual researchers and key stakeholders, their knowledge in these areas are considered to be adequate and trustworthy. Overall, the quality of the research is considered to be good.

3.6 Ethics of research

Harm to participants, lack of informed consent, invasion of privacy and deception are four ethical principles to guide an ethical research design [19]. In this case, it was important that the researchers were aware that sensitive data might be collected as the case concern high security information and company confidential information. Hence, it was important to all involved that no invasion of privacy was breached when collecting data or presenting findings. It was also important to stay truthfully and not act based on hidden agendas, with respect to both company- and security classified information. Prior to the research, a contract was written between the researchers and the studied company, limiting the information that could be included in the thesis.

Although ethics are important to research, the content and influence was minimized. In this case, a lot of confidential information was derived from the data collection process, and most of all: the Risk Workshop. This implied that all results could not be presented, and as it a vital part of the analysis, it led to weaker quality of the research. The reader would not be able to take part in all of the research findings, a similar result is more difficult to re-create. Also, the trustworthiness of the findings could be questioned, since there are no evidence that the results actually exists and are true.

4. The case

The chosen company to study was Saab Group since its products and services operate within a rapid-changing business environment. The sheer size of the organization in terms of generated sales and amount of employees is also convenient for the research since a large organization may allocate more resources into managing risks, compared to a smaller organization. Hence, valuable information is expected to be withdrawn from such a large organization. In addition, Saab faces a strategic risk that described later in this chapter, which fits the research very well.

4.1 Company background

Saab was founded in 1937, during a time where Europe was on the brink of a major conflict. Although Sweden has remained at peace and kept neutral stance in international conflicts, the nation wanted to prepare for the worst. Saab was founded to secure Sweden's supply of military aircraft as part of its drive to maintain national security and sovereignty [27]. Today, Saab has 16 000 employees and is a global provider of products and services within the military defence and civil security industry [28]. During 2017, Saab had annual sales of 31 billions, of which 23 % were re-invested in Research and Development [21]. Hence, Saab is considered a company with high-tech products, making it a suitable research object in a rapid-changing environment exposed to strategic risks.

4.2 Introduction to the strategic risk

The risk originates from increasing demand in mobile data traffic capabilities consequently leading to possible regulatory changes in frequency allocations. The phenomena of increasing global data traffic and the regulatory process of frequency allocation is described in this chapter and why it is a strategic risk for Saab.

4.2.1 Increasing global data traffic

It has been predicted that global mobile data traffic will grow seven-fold between 2016 and 2021 with a compounded annual growth rate of 47 %. During 2017, the monthly amount of global mobile data traffic usage was 11 exabytes and is expected to increase to 47 exabytes per month by 2021 [29]. To meet the growing demand of data traffic, 5G networks are expected to provide enhanced characteristics compared to current network technologies. However, enabling a feasible 5G technology requires allocation of additional radio spectrum for mobile broadband supported by flexible spectrum management capabilities. Hence, there is naturally a strong push for making regulatory decisions in favor of high-technological emerging market possibilities [30]. However, the regulations should balance the interests of all stakeholders, such as the possibility for sufficient military radar surveillance.

4.2.2 Concerns with regulatory changes

Since the growth of mobile data traffic is high, allowing broadband users a broader system bandwidth may seem well motivated. An increased frequency allocation for mobile broadband services implies that spectrum in which other incumbents may already operate, will be decreased or shared to make room for mobile broadband users. Although the advantages of the 5G network are many, a shared or decreased spectrum between incumbents stresses the importance of effective spectrum management, which in some cases can be troublesome. A major strategic risk arises when incumbents are users of military services, since these kinds of services concern national security and rely heavily on feasible spectrum management capabilities.

5. Results

In this chapter, the risk assessment results are presented, focusing on the process of applying best practice of risk management tools on a strategic risk. The first section describes the decision making process that causes the risk and how the researchers evaluated it. After that, the risk workshop is presented with reflections of the process. However, the exact outcome from the workshop is not included due to company confidentiality. Finally, the results from using the Bowtie Model, Heat Map, and PAPA Model are presented, followed by a brief case summary.

5.1 The decision making process

Since the risk is regulation based, it is necessary to understand the decision making process and its involved stakeholders. The next sections contain findings from the interviews with researchers within frequency allocation policies and further descriptions of the identified parts of the decision making process, i.e. the external process that causes the risk event. As can be noticed, many stakeholders and authorities exist in the process which makes it very difficult to drive individual agendas.

5.1.1 Authorities in the process

By interviewing researchers within frequency allocation policies, an initial understanding of the international and national frequency decision making process was created. It was found that frequency policy is first formed at United Nations (UN) level, supported by guidelines from regional associations, such as the European Union (EU) to be further revised at national level. At UN level, the decisions are made in the International Telecommunication Union (ITU) and an EU association

that coordinates this type of questions between countries called European Conference of Postal and Telecommunications Administrations (CEPT). At EU level, there is also a committee called Radio Spectrum Committee (RSC) and a group named Radio Spectrum Policy Group (RSPG) that works with the spectrum subject. In Sweden, the Swedish Post- and Telecom Authority (PTS) is the national authority that develops the frequency allocation plan for spectrum users. To further understand the different decision makers' roles and impact levels, descriptions of PTS, ITU, CEPT, RSC and RSPG are provided in the following sections. PTS is considered to be a good representation of how frequency policy can be managed on national level. To understand similarities and differences between specific national authorities, the ITU member state list can be studied [31].

5.1.2 Swedish Post and Telecom Authority

PTS monitors postal sectors and the electronic communications in Sweden, including telephony, internet, and radio [32]. PTS works with seven general goals, including maximizing the society's benefits from radio frequency allocation and to promote electronic communication markets to be well-functioning with sound competition [33]. Since radio spectrum is a limited natural resource with many applications, the development of the national frequency plan must consider various stakeholders and demands. There is an increasing need of using frequencies with modern high-technological equipment. To meet these requirements and to prioritize different benefits of technology PTS must optimize the socioeconomic benefit to society [33, 34].

Although PTS has the final decision power for Sweden's frequency allocation policy, the possible decisions are limited by recommendations and requirements from both EU- and UN level [34]. PTS represents Sweden in both ITU and in EU authorities with collected opinions from Swedish companies and other national organizations. However, PTS cannot represent all different opinions since they often contradict each other and has to choose a common stand [35]. The interviewed key stakeholder, working at PTS, considers that PTS has adequate leeway to make suitable changes

to adapt recommendations from ITU and EU authorities to the Swedish conditions. Furthermore, the interviewee describes the Swedish policy development process as a two part process. First, confidential negotiations are made with The Armed Forces to ensure that enough frequencies are allocated for national security. Secondly, PTS strives to follow the EU- and ITU recommendations and invites stakeholders to bid on the remaining frequencies with the aim to maximize social-economic benefit for society. If a company wants to contribute to PTS' work and represent its stands, it can attend preparatory meetings and be part of a preparatory group.

5.1.3 International Telecommunication Union

On the highest international level, decisions regarding which type of equipment that should be recommended to operate in a certain frequency span are made by ITU, which is the United Nations' specialized agency for information and communication technologies. The recommendations are presented in the Radio Regulations [36]. Currently, ITU consists of 193 member states and over 700 members, including regulators, universities, research and development institutions, telecom companies, internet companies, broadcast companies, satellite companies, software companies, and other organizations [37]. The decisions for ITU's regulations are made during World Radiocommunication Conferences (WRC), which are held every three to four years, the next in 2019. The final agenda for a WRC is set two years in advance by the ITU Council with the concurrence of a majority of the member states, based on agenda preparations that are initiated two to four years before the finalization [38].

ITU's regulations leave the member states with national decisions on how to follow recommended frequency allocations, with the requirement to not disturb neighbour countries that follows the ITU recommendations [39]. A trend has been observed that countries follow the recommendations better and better, which was mentioned during the researcher interviews. Within ITU, the radio-communication sector (ITU-R) is responsible for these types of questions [40]. The sector divides the member states into three regions, with strong recommendations of regionally harmonized frequency allocations [41].

To influence ITU-R decisions, a company can participate in research and other preparatory work prior to WRC. A company can join as a full sector member or as associate, depending on the level of desired involvement and available resources. ITU empathizes the possibility to influence decisions as a major member benefit [42] and the current member list is predominantly including telecom and other network companies [43, 31]. There are five study groups where member companies can participate, although associate members are limited to participating in only one group. The work groups provide recommendations on WRC decisions based on their research findings [44]. However, the recommendations from the work groups are no guarantee that contradicting decisions will be taken at the WRC. During the interviews with the PTS representative and researchers within frequency allocation policies, it was mentioned that the decisions at WRC are taken in consensus with all member states.

5.1.4 European Conference of Postal and Telecommunications Administrations

CEPT includes 48 European member countries and works to achieve cooperation on regulatory, commercial, operational, and technical standardization issues [45]. By involving expert regulators and policy makers from its member countries across the continent, CEPT strives to create a more dynamic and stronger market in the electronic communication and postal sectors [46].

The Electronic Communications Committee (ECC) is one of the three business committees of CEPT, with responsibility for developing common policies and regulations in electronic communications and related applications for Europe. ECC works to create common stands for the member countries prior to WRC to support its overall goal to use spectrum as efficiently as possible in the interest of all citizens [46, 47]. ECC welcomes active external participation from companies to complement its members' own expertise, e.g. by participating in its different working groups [46, 48].

5.1.5 Radio Spectrum Policy Group & Radio Spectrum Committee

RSPG is a high-level advisory group with the purpose to assist the European Commission in the development of radio spectrum policy [49]. The members are senior representatives from the member states, primarily from authorities such as Swedish PTS. Also, representatives from CEPT, European Telecommunications Standardization Institute (ETSI) and European Economic Area are invited as observers [49, 50]. RSPG uses public consultations where all stakeholders are invited to give written comments on proposed drafts and opinions.

RSC's main purpose is to convey member states' perception regarding decisions made by the European Commission. The committee consists of representatives from the member states and the European Commission. Other countries' representatives, the European Parliament, CEPT and ETSI can participate in the RSC's meetings as observers [51, 52].

5.2 Risk Workshop

Due to company confidentiality, the outcome of the Risk Workshop can not be presented in this thesis. However, the three risk scenarios and the analysis of the discussions during the workshop can be presented.

- **Scenario 1:** Certain bandwidths that Saab uses will be shared with telecom actors within five years, i.e. after the next WRC.
- **Scenario 2:** Countries in which Saab has or is interested in having business will have increasing differences in frequency allocation policy within next five years.
- **Scenario 3:** All bandwidths that Saab uses will be shared with telecom actors in the long term.

Although the risk assessment was limited to the predetermined three scenarios, other possible similar scenarios were also brought up by participants to be briefly discussed. The creation of scenarios was considered to be difficult by the researchers since few scenarios might not cover all interesting outcomes while many scenarios will require more resources to assess and add complexity to the process. Another discovered challenging aspect of creating scenarios was how specific they should be formulated. General phrasing includes more outcome possibilities but also opens up for individual assumptions that can make answer comparison more difficult. Scenarios with much details will ensure that individuals interpret scenarios similarly but naturally limits the covered outcomes from the scenarios. Furthermore, it was considered difficult to set a time for when the likelihood of occurrence for the scenarios should be evaluated because of the high level of uncertainty.

The discussions revealed individual perspectives on the risk which could often be linked to functional expertise. A variety of assumptions divided the discussion into several parts. The group did not clearly agree on some parts which resulted in remained contradicting assumptions within the group. Another reoccurring discussion was possible opportunities linked to the risk event scenarios. Since the scenarios would change the conditions in the whole market where Saab operate, several opportunities for competitive advantage were identified. Moreover, expressions from participants claimed that the Risk Workshop format did not allow voting on upside opportunities but only on potential negative risks.

Moreover, the individuals different interpretations of the risk event once again caused some variation in their opinions. The awareness of a time constrain may have limited the discussions which included complementing perspectives from the different functions in the company.

In addition, the participants found it difficult to set probability percentages since they had not been part of the decision making process and because of low insight to the other stakeholders' perspectives.

5.3 Bowtie Model

The Bowtie Model and its adoption to strategic risk assessment are described in Section 2.2. After understanding the decision making process behind the strategic risk and performing the Risk Workshop, the model was used to summarize the findings. The following sections discuss Saab's prevention and mitigating capabilities that provided the basis for the final recommendation to act on the strategic risk.

5.3.1 Prevention capabilities

Based on the information about the decision making process, presented in Section 5.1, four main actions for Saab to represent its opinions and to influence frequency policy changes are identified. The four alternatives are presented below with brief information regarding the possible level of impact and estimated resources needed to participate.

- Ensure that the Swedish Armed Forces and other customer countries' corresponding authorities are promoting a frequency policy that is aligned with the functionality of Saab's equipment. This action is estimated to require low amounts of resources and a high level of influence compared to other preventive actions.
- Participate in PTS and other customer countries' corresponding authorities to represent Saab's stand as a military radar equipment provider. Resource levels are highly dependent on the number of countries and level of involvement. The influence will primarily be limited to national regulations.
- Participate in the ECC committees of CEPT and corresponding administrations for other continents to contribute to aligned regulations between the included countries. This can be a resource-efficient way to influence multiple countries at the same time.
- Participate as an associate or full sector member in ITU-R. This possibility, to influence a significant number of stakeholders based on a specific stand,

is considered to be low compared to the required resources to participate. However, participation can be an important step to develop better co-existing solutions between military radar equipment and other actors' devices.

Overall, Saab's possibility to influence the international frequency policies as an individual company was considered to be low, based on an analysis of the decision making process. However, since Saab's stand is also in common with The Armed Forces in their customer countries, the company should ensure that the common stand is conveyed effectively to the national decision makers as a defence priority. For being part of multiple nations' aligned frequency policy efforts, CEPT and corresponding authorities should be considered as another option. ITU membership is primarily recommended as a way to contribute to research for future co-existent solutions together with other actors, such as companies in the telecom industry. Finally, Saab should also consider cooperating with other actors providing military radar equipment if the amount of required resources is considered to be too high. The purpose of such a cooperation would be to get a stronger position to influence decisions on frequency allocation policies but also with respect to maximize the social-economic benefit to society by participating in cross-industry research, e.g. in ITU-R.

5.3.2 Mitigation capabilities

Based on cooperation with the key stakeholders of the strategic risk at Saab, three main mitigation possibilities could be derived.

- Acquire or develop patents with new technology which can sustain functionality for Saab's radar products in an environment with shared system bandwidths. This can mitigate the downside effect on the feasibility to Saab's technology.
- Proceed into a joint venture with another organization holding compatible capabilities to manage a shared system bandwidth situation, or other feasible solutions that Saab currently lack. This might also mitigate the downside effect on the feasibility to Saab's technology.

- Consider a strategic collaboration with the other parts of the shared spectrum situation. For example, telecom companies, the Swedish Armed Forces or other parties that might be involved in the conflict. Again, this has a chance to mitigate the downside effect on the feasibility to Saab's technology.

5.4 Heat Map and PAPA Model

In addition to the Bowtie Model, the project group used a Heat Map and the PAPA Model to visualize the results and to determine what further actions are recommended. The input to this activity was the output from the Risk Workshop combined with insights from the Bowtie Model. Since the prevention capabilities are estimated to be low, future actions are suggested to explore the different mitigation actions. The results from the Heat Map and from the PAPA model's recommendations can not be included due to company confidentiality. For the likelihood 1-5 scale, the standard deviation of participants' answers for the different scenarios ranged between 0.58 and 0.96. The corresponding standard deviation for impact on business objectives on the 4 grade scale ranged from 0 to 0.94.

5.5 Case summary

From studying the strategic risk of frequency regulation changes from Saab's perspective by applying industry best practice tools for risk management, the challenges associated with this type of risk have been experienced. The outcome from the assessment was an understanding of the external process that causes the risk, a quantitative evaluation from the Risk Workshop, a Heat Map and recommendations for actions according to the PAPA model. Since the focus when describing the results has been on the performed process, it gives the basis for Chapter 6 where the findings and assessment experience is compared to the theoretically hypotheses on strategic risks described in Chapter 1 and 2.

6. Discussion

From the case study at Saab, aspects regarding assessment of strategic risks has been found. This chapter includes a discussion of the findings from applying industry best practices of risk management for assessing a strategic risk. Furthermore, the SRM experience and its differences from TRM is compared to the hypothesized difficulties, described in Chapter 2. Finally, other reflections on the performed risk management process that are not directly linked to strategic risk are presented.

6.1 Discussion of strategic risk management

Based on the findings from the data gathering and understanding of the external origin of the risk, the overall analysis is that the strategic risk at Saab is complex to assess due to its dimensions of uncertainty, which is typical for strategic risks [10]. The high standard deviations from the participants' assessment during the risk workshop confirm that there are room for different individual opinions and assumptions that can dramatically affect the outcome of the strategic risk assessment. By carefully studying the risk assessment process, the experienced challenges can be summarized in three main traits that made the strategic risk difficult to evaluate: the uncertainty of the risk event itself, the external risk origin and the opportunity potential in the risk.

6.1.1 Uncertainty of risk event

One main driver of causing the risk assessment to be difficult was the uncertainty in the risk event itself. As the WRC is an event that is supposed to occur during 2019 (one year from now) the time aspect is quite significant since it is so far ahead. Compared to traditional risks, a time horizon of one year to the risk event may seem a bit stretched, considered that TRM's focus was on insurance and financial risks [3]. TRM was mainly about the use of swaps and options to hedge interest rates and commodity prices [5]. Those kind of risks will most certainly not have a time horizon of one year ahead, but rather short-term implications on the income statement. If risks are pinpointed to a specific well-known risk, it is a lot easier to prepare for it. However, the three risk scenarios developed for the Risk Workshop was thought to fill that purpose. The difficulty lied in the level of detail of the description of possible outcomes from the risk event since outcomes cannot be known for sure. As a strategic risk arisen from political decisions, the consequences are not clear today and could impact business over time which might be several years. Hence, to develop too narrow risk scenarios will cause higher risk of validity error, and too broad risk scenarios might not be reliable enough to draw any valuable conclusions from. However, when facing a strategic risk, there is a lot of uncertainty that needs to be dealt with, one way or another. Hence, it can be concluded that the level of uncertainty of the future outcomes from strategic risk events is a main driver of SRM that makes it challenging to assess strategic risks.

For the case study's usage of best practice risk management tools, both the Bowtie Model and the Risk Workshop requires a clearly defined risk event as a basis for further assessment [16]. This requirement was difficult to fulfill for the strategic risk where multiple parallel assessments had to be made for a set of scenarios. This realization confirms the main point expressed by emerging risk management, which is that risks that are uncertain and lack historical data must be assessed in several possible scenarios [15]. However, the best practice tools does not provide a recommendation and adequate instructions for how scenarios can be created. This

challenge is also aligned with previous experience from the Bowtie model which was mentioned in Chapter 2, where unspecific risk events have caused difficulties for the assessment members, requiring individual interpretation. Since SRM can be defined by its uncertainty [10], it is natural that this challenge can be particularly prominent for strategic risk.

6.1.2 External origin

The next factor that is believed to impact the difficulty to assess the strategic risk was the lack of insight of the regulatory process leading to possible risk impact. Since the risk scenarios in the Risk Workshop involved a rather complex regulatory decision making processes, which the participants had limited or no knowledge about, the predicted outcome was difficult to estimate accurately. However, the participants were chosen based on competence specific for this case to contribute in the best way possible. Still, the predicted outcome from the strategic risk event was widespread. It is believed that the best internal competence for the question was included, so the large variation in answers is believed to be caused by the complexity in the strategic risk event. Hence, the analysis is that the very nature of the risk event made it hard to make fair predictions. Besides, it is not uncommon that these kind of risks are difficult to predict. This is supported by earlier research in the field of SRM and ERM which also mean that strategic risks are difficult to predict due to uncertainty of the future [14, 15]. Hence, the lack of ability to identify political and major macroeconomic shift could not be helped, according to Kaplan, who means that such risks can rarely be controlled or influenced at all [14].

In addition, the case data indicate as well that a strategic risk without the reach of company control are not easily estimated. Hence, the external nature of a strategic risk has a clear negative correlation with the ability to identify it. Moreover, the tendency that people rely on historical data from similar risk events in the forecasts of future strategic risks [14] is also dangerous. As been proven by the outcome from the Risk Workshop, little reliable information could facilitate a certain estimation of risk impacts. The spread in standard deviations indicated that so was the case,

as well as explicit expressions from participants.

In summary, the external origin of the strategic risk event complicated the company's internal assessment of likelihood of occurrence during the Risk Workshop and dramatically limited the prevention capabilities in the Bowtie Model. The limited possibility to prevent the strategic risk event comes as no surprise since the strategic risk can be defined from the external events [3] and that general recommendations to focus on mitigation has been expressed from previous SRM research [14].

6.1.3 Opportunity potential

What both the Risk Workshop and Bowtie Model failed to evaluate was the potential upside of a strategic risk. Since both methods was structured with an assumption that all risk is negative, a complete fair evaluation of risk impact was impossible. If the strategic risk pose both risk (negative) and opportunities (positive) depending on how the risk is managed by the company, a fair judgment is impossible by only using these methods. As has been stated in Chapter 5, some participants of the Risk Workshop expressed the conflict of not taking into consideration the potential benefits of the strategic risk but only the damage it can do. This might have led to a wider spread of risk impact than necessary if all participants had the same assumption about what a risk really means. Moreover, the possibility to treat a risk as an opportunity is not the traditional approach to risk management [16]. Since the Bowtie Model shows that the risk should either be prevented or mitigated, it indicates that the risk is unwanted to occur at all. A contrast of that assumption, is the perspective on SRM with the aim to eliminate downside risk while attempting to optimize economic return from alternative business initiatives under uncertain market conditions [1].

The idea of optimizing economic return from business initiatives outside the core business operations could be thought of from a SRM perspective. As strategic risks are believed to pose a treat to business objectives [10, 13], an alternative view

on strategic risks which welcome strategic risks as business opportunities could be adopted. During the Risk Workshop, participants expressed opinions that such a risk can actually prove to be more beneficial to Saab than harmful. The motivation was that Saab as a company with high focus on research and development is agile enough to respond to strategic risks in time to grasp the upsides before competitors. Hence, the underlying assumptions of strategic risks make it more difficult to make a common and accurate assessment.

The industry best practices that was used in the case study did as mentioned not address opportunity potential related to the risk. Even though opportunity possibilities was discussed during the Risk Workshop, the best practices did not promote any documentation of these. SRM can be viewed as an important part of creating competitive advantage [1], while the used industry best practices are only concerning minimizing competitive disadvantage. To effectively assess all aspects of strategic risk implications that can possibly threaten a whole industry's value [3], there must be a clear way of identifying and document related competitive opportunities. It is likely that strategic risks due to its high level of corporate impact is more often related to major opportunities than traditional risk, complementing the solely negative threats.

6.2 Risk management reflections

The assessment criteria during the Risk Workshop was based on preset scales for both impact (1-4) and likelihood of occurrence (1-5), only allowing whole integers. This could potentially have led to a higher rounding error than if the participants ranked more specific values between two integers. It is possible that differences exist for whether a participant chooses to round to the nearest integer or to the lowest of the two. These kind of methodological errors can have an impact on the outcome, since the quantitative assessment does not include fractional components during assessment. In addition, the strength of mitigants' assessment during the Risk Workshop might also include errors since participants may have different views

on whether a mitigant is in place or not. The listed voting options was described loosely to the degree that inconsequential interpretations could take place.

For the case study's usage of the Heat Map and PAPA Model, no specific difficulties due to the strategic risk nature was experienced, although the input to the Heat Map, i.e. the output from the Risk Workshop, included several challenges described above. A potential risk of using the PAPA Model to manage risks in general might be that it becomes too general and over-simplified if only four action possibilities exist (Prepare, Act, Park, Adapt) [17], thus not treating individual risks sufficiently specific as they should. There might occur scenarios were more alternatives should be considered due to varying risk characteristics.

6.3 Further research

It has been concluded that none of the used methods are fully comprehensive to grasp the full nature of a strategic risk. Further research is recommended to study both how strategic risks could be managed to successfully cover the high levels of complexity and uncertainty, while also considering and evaluating opportunities. Since this project only included one case study, it is also recommended to test the findings and described shortcomings in industry best practice for risk management for strategic risk by studying similarities and differences in applying the methodologies on strategic risks in other business settings. Due to the rapid market development in the high-tech industry with a high need of managing the associated risks, future studies within this industry is considered to be particularly interesting.

7. Conclusion

Three key traits of strategic risks are considered to make the application of industry best practise tools on strategic risks more challenging, which is supported by covered theory and the case study findings. First, the uncertainty of a strategic risk event's outcome makes it challenging to formulate a clear event to evaluate. This characteristic stresses the importance of developing several complementing scenarios, effectively balancing the level of detail and number of included scenarios. Second, the external origin of the strategic risk process makes it more difficult to both prevent the risk and to quantify risk impact and probability of the risk's occurrence. Third, the opportunity potential that was found in the case study's strategic risk was not explored sufficiently, nor documented by the industry best practices for risk management.

From the three key traits, it can be concluded that a specifically suited risk management methodology could be beneficial to assess strategic risks. Based on this research, the primary challenges for such a process will most likely be to create a rigorous understanding of the external process that causes the risk event, generate scenarios that effectively describe the likely risk outcomes and to promote the seizing of competitive advantage based on potential risk opportunities.

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Appendix

A. Risk Workshop Invitation

Risk Workshop Invitation

Assessment of the risks related to changes in spectrum regulations

Time: Monday 7th May 14.00, **Location:** Varberg conference room, floor 8

Language: Swedish

INTRODUCTION

Hi everyone!

You're very welcome to attend a risk workshop at Saab Kallebäck since we believe that your participation will have an essential contribution to the workshop's outcome. The workshop will be led by us, Alexander Lesser and Johannes Berghult - both Master of Science students from Chalmers University of Technology. We're currently doing two thesis projects at Saab Group: one for University of Gothenburg and one for Chalmers. Our current thesis addresses the issue of spectrum regulations and how potential changes can affect Saab's competitiveness. Possible changes include 1) a decrease of allocated frequencies for military radar equipment, 2) shared spectrum with other actors (such as telecom companies), and 3) differences between countries' policies. Our intention is to help Saab to assess this risk, which has an external origin and is problematic to quantify due to its strategic nature.

AIM

The aim is to have an open discussion about what possible consequences this long-term strategic risk can have on business objectives at Saab, and to assess the risk by anonymous voting according to predefined qualitative scales. There will be a broad strategic focus on risks and risk drivers with the expectation to learn from the holistic view created by a wide set of participating competences.

EXPECTED OUTCOME

The output of this workshop will be to learn how the spectrum regulated risk can potentially affect business objectives at SAAB, including a qualitative assessment of the risk.

AGENDA

Prior to the workshop, scales for *magnitude* of impact, current *mitigants' strength*, and *probability* of occurrence will be established and presented to you at the workshop. The scales will be used to aid the evaluations, by enabling participants to vote anonymously. The agenda will follow the process below but will also allow further discussions.

1. **Background to the project**
2. **Introduction to the risk scenarios**
3. **Assessment of magnitude**
4. **Assessment of current mitigants' strength**
5. **Assessment of probability**
6. **Conclusion**

PREPARATION

1. Since all participants will be asked to contribute by online anonymous voting, it's recommended that each participant brings an own laptop.
2. It's suggested that each participant prepare by thinking about the risks' possible consequences related to the business categories: Market, Performance, and Innovation (from Saab's annual report 2017). Since you are invited to represent your functions' expertise, it's especially beneficial if you also contribute with how the risk can affect objectives of that function.

CONCLUDING WORDS

We look forward to your participation and if you have any questions, please feel free to contact us at any-time.

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