Scoping the field of Enterprise Risk Management – and implementing it at Kraftringen AB

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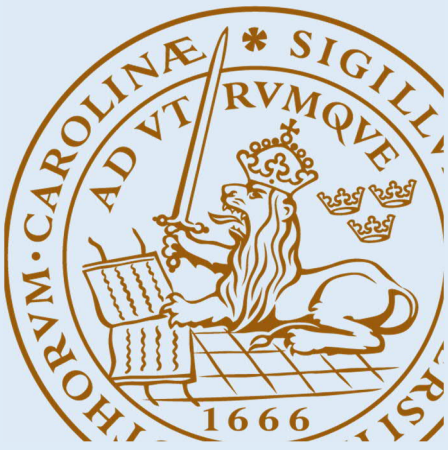

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Abstract:
Enterprise Risk Management is implemented in various sectors and context. What is really know about ERM and how has the concept progressed parallel to risk research in general? This master thesis investigates some general aspects of ERM and what specific aspects of risk management research is present in current scientific literature. The thesis will consist of a scoping study and a practical implementation at the utility company Kraftringen. Based on the results from the scoping study, results will be used to enhance the implementation at Kraftringen. Some of the most important results were: Ambiguity in terms of implementation, lack of detail, duality of holism, incoherence about uncertainties, importance of communication, lack of dealing with black swan events, lack of questioning of background knowledge and lack of achieving resilience. The recommendations to Kraftringen were: Complement the ERM model with appropriate "hybrid model" to make ERM more sensitive to organizational context, the importance of being value-centric, shaping of communication channels, increase awareness of uncertainties and black swan events, reap the benefits from single- and double loop learning.

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Summary

Enterprise Risk Management (ERM) is often described within the literature as a way of enhancing the risk management processes of a company. A common standpoint found is the ambition of ERM. That is, to manage all the risks of an enterprise in a coherent and holistic manner. However, a coherent view on its actual implementation seems to be lacking. A possible way to enhance the concept of ERM is to search within a nuanced view of risk management referred to as "the new risk perspective". Given the fact that ERM and risk management in general have progressed and evolved, there is reason to believe ample room for knowledge exchange and idea-transfer between the fields exist.

The research aim was set to evaluate whether there are any key ideas within the new risk perspective that can complement ERM and how Kraftringen can utilize these key ideas in the development of their risk management process. To attain the research aim, two research questions were formulated:

1. *What is known within scientific literature regarding ERM and what part of the new risk perspective is already present or represented?*
2. *How can the ERM implementation at Kraftringen be improved with the results from the scoping study?*

To answer the research question, a scoping study was conducted in order to find what is known within the scientific literature regarding ERM and the new risk perspective. The conclusions and results from the scoping study were then applied at a case study of Kraftringen AB, with the intent to enhance and complement their implementation of ERM.

The new perspective on risk management include valuable aspects, treating certain aspect often neglected in ERM practices. To acknowledge these aspects e.g., uncertainties, holism, communication and resilience, a better ERM process is thought to be attained. The scientific literature showed ambiguity in practical ERM implementations. For organizations, like Kraftringen, an own process is created with support of existing frameworks. This approach could better acknowledge the lacking aspects of ERM and allow a customized risk process. Thus, bringing the intended value for Kraftringen and overcoming the possible "illusion of control" formalized guidelines would bring. It shall also be noted that an ERM-process must be evolved over time as it will not solve everything at once. By managing the process step-by-step, as Kraftringen intend to do, with launching of pilot-projects, a mature ERM will grow into the organization.

Another important result is to harvest and storage knowledge. As a scenario analysis will reveal, organizational learning is possible. With small means, a more solid management of risks can be attained. This can be expressed in the form of reaching coherence in how risks are defined and understood in the organization, by storing different judgements made by for example, employees at the sharp end of operations. A better foundation in decision making can be achieved. The knowledge of past judgements is imbedded within the organization, ultimately to be used when need for future judgements arise.

Sammanfattning

Enterprise Risk Management är ofta beskrivet inom den vetenskapliga litteraturen som ett sätt för företag att hantera dess riskhantering på ett bättre sätt. ERM medför en ambition att hantera alla företagets risker heltäckande och sammanhängande. Samtidigt verkar det råda oklarheter om hur konceptet faktiskt ska implementeras. En möjlighet att utveckla ERM kan finnas i framsteg gjorda på andra forskningsfronter gällande riskhantering. Vad som ibland kallas för det ”nya riskperspektivet”. Med tanke på att ERM och det nya riskperspektivet har utvecklats parallellt och utan några synbart större kopplingar är det intressant att undersöka om det finns utrymme för kunskapsutveckling mellan områdena.

Syftet med uppsatsen är att utvärdera om det finns några nyckelbegrepp inom det nya riskperspektivet som kan komplettera ERM. Samt att testa dessa i praktiken genom en fallstudie vid Kraftringen AB. För att uppnå ovannämnda ska följande frågeställningar besvaras:

1. *Vad är känt inom den vetenskapliga litteraturen gällande ERM och vilka paralleller kan dras till det nya riskperspektivet?*
2. *Hur kan Kraftringens implementering av ERM förbättras med hjälp av resultaten från scopingstudien*?

För att utvärdera frågeställningarna genomfördes en scopingstudie. Resultaten och slutsatserna som kunde dras applicerades sedan på en fallstudie på ett av Kraftringens affärsområden, med ambitionen att förbättra och komplettera ERM processen.

Det nya riskperspektivet bidrar med värdefulla aspekter, aspekter som ibland saknas inom ERM konceptet. Genom att beakta bland annat osäkerheter, holism, kommunikation och resiliens är det troligt att en bättre ERM process kan uppnås. Den vetenskapliga litteraturen visade tvetydiga resultat gällande den praktiska implementeringen av ERM. Det finns dock skäl att tro att detta är av mindre betydelse. Genom Kraftringens ambition att utveckla ett eget ramverk för dess ERM process finns det utrymme att implementera ERM som ger företaget bättre möjligheter att lyckas med sin riskhantering. En hantering bortom ”illusionen av kontroll” som tungt formaliserade riktlinjer ibland medför. Istället för att följa ett redan utarbetat ramverk möjliggörs genom en egen anpassning, en riskhantering som passar företagets behov och industriella kontext. En fullständig riskhantering uppnås inte över en natt, processen måste växa fram steg för steg. Kraftringen avser att göra detta avdelning efter avdelning med start i pilotprojekt.

En annan viktig lärdom fån litteraturen och fallstudien är den om kunskap. Genom att möjliggöra plattformar för organisatoriskt lärande vilket belystes genom bland annat en scenarioanalys. Med små medel kan en mer solid riskhantering uppnås. Således lagras kunskapen inom organisationen och underlag för framtida beslut finns då tillgängligt. Genom att bedöma och utvärdera risker på samma sätt inom organisationen finns det skäl att tro att detta kan leda till att bättre beslut fattas med avseende på risker och osäkerhet.

Table of Contents

Introduction 1
Rationale and research aim 2
Research Objectives 2
Research Questions 3
Thesis structure 3
2 Scoping Study 4
2.1 Scoping Study Methodology 4
2.2 Scoping study 4
2.3 Scoping study limitations 5
2.4 Scoping study: ERM literature 5
2.4.1 Step 1: Identifying Research Question 5
2.4.2 Step 2: Identifying Relevant Articles 5
2.4.3 Step 3: Article Selection 8
2.4.4 Step 4: Results and analysis from Scoping Study 10
2.5 Results: ERM in the literature 11
2.5.1 Definitions of ERM 13
2.5.2 Risk assessment in ERM 14
2.5.3 Risk Culture and objective setting in ERM 16
2.5.4 Risk identification in ERM 17
2.5.5 Hybrid models for enhancing ERM 18
2.5.6 Critique and flaws of ERM 21
2.6 Results: Frequency of the new risk perspective in the literature 23
2.6.1 Uncertainties 24
2.6.2 Black swan 28
2.6.3 Holistic 31
2.6.4 Background knowledge 34
2.6.5 Limitations 36
2.6.6 Protective values 39
2.6.7 Resilience 42
2.6.8 Robustness 44
2.6.9 Communication 45
2.7 Summary of the results 49

2.8 Discussion 50
2.8.1 General discussion 50
2.8.2 Limitations 53
2.9 Conclusions 55
3 A Case study of the ERM-process at Kraftringen 56
3.1 Introduction 56
3.2 Methodology 57
3.3 Design proposition 58
3.3.1 Holistic model 59
3.3.2 Practical example - Business unit district heating and cooling 63
3.3.3 Scenario analysis 65
3.4 Discussion 67
3.5 Conclusion 70
4 General conclusion 71
References: 72
Appendix A: Studied literature 76

Introduction

Enterprise Risk Management (ERM) is considered a "young" field of study. Previously, risk management within companies were primary associated with hedging or insurance. The people carrying out the task were usually located within the financial departments of a company (Nocco & Stulz, 2006, p. 8). When risk-management spread and became something conducted in every department it gave rise to other problems. This silo-based approach to risk was soon deemed inefficient and unable to foresee risk as part of a bigger picture, whether it was company scandals such as Enron in 2001 or the financial crisis in 2008. A key part of the problem has been pointed out to be lack of governance (Altman & Cooper, 2004). What ERM strives to achieve is to offer a holistic view of the enterprise, and to manage all of its risks in line with its set of strategic objectives (Gifuna & Karydasb, 2010, p. 55). ERM is not however, a unified method and various interpretations and implementations of the concept have sprung out and evolved over the years (Bromiley, McShane, Nair, & Rustambekov, 2015, p. 266). A common standpoint between the interpretations of ERM is the ambition of managing all the risks of an enterprise in a coherent and holistic manner. This is commonly referred to as managing the "risk portfolio" of a company (Bromiley et al., 2015). The management of a risk-portfolio could be described as the opposite of handling risk on an individual basis, which often is the case when different departments of an enterprise manages different risks (Nocco & Stulz, 2006).

Along with the emerging implementations of ERM, the traditional risk management have seen developments and progress. The "traditional" application has often revolved around safety related issues in so called "high risk industries" such as the nuclear industry. Traditional risk management that is usually consisting of quantitative analysis and linear models, i.e. the butterfly model or event trees (Aven & Ylönen, 2018). This type of probabilistic analysis has then been used to support decision-making. The risks have then been deemed either tolerable or neglectable in relation to some form of threshold or criterion (Aven & Ylönen, 2018, p. 15). A lot has happened to this traditional view of risk during the last 20 years. Some key ideas from sociotechnical safety literature presented in (Aven & Ylönen, 2018) progresses the concept of risk management into what we will refer to as the "new risk perspective".

The "new risk perspective" embeds several major differences to the traditional view of risk management (Tehler, 2020, p. 26). One example is the focus on uncertainties rather than probability. Uncertainty is a broader term and includes probability, which in turn can be a way to express uncertainty. Another difference in the new risk perspective is the inclusion of activities which previously was outside the scope of risk management i.e. continuity planning, vulnerability analysis, capability ability analysis (Tehler, 2020, p. chapter 7 & 8). One beneficial aspect of the new risk perspective, from a corporate point of view, is the ability to connect risk and risk management with the strategical objectives of an organization, also known as "performance management" (Thekdi & Aven, 2019).

Given the fact that ERM and the new risk perspective have progressed and evolved there is ample room for knowledge exchange and idea transfer between the fields. ERM has been implemented in various sectors. Starting in the banking and the financial sector, implementations of ERM can now be seen in other sectors e.g., universities and utility companies. One of the most cited, according to Lundqvist (2014a) is the ERM implementation at the Canadian electrical utility company Hydro One Inc (Aaabo, Fraser, & Simkins, 2005). In Skåne, Sweden, the power company Kraftringen have just like Hydro One Inc, chosen to implement enterprise risk management.

Kraftringen AB is an electrical utility company owned by the municipalities of Lund, Eslöv Lomma and Hörby. The main objective according to the company is not the maximized rate of return but rather to gain commercial societal benefits. The company stats that "*out of respect in regard to social, economic and environmental responsibility, guarantee that the municipality inhabitants receive the safest supply of energy possible*" ("Krafringen," 2018). As of now Kraftringen is exposed to a variety of risks, not just economic and market related, but also safety related. Kraftringen possesses a vast number of physical assets such as combined heat and power plants, electrical grid, electrical transformers, office buildings et cetera. Kraftringen have recently started a reconstruction of their risk management processes with the intent of a complete ERM implementation. An implementation with the intent of managing the whole corporate risk-portfolio including the ones associated with safety issues.

Rationale and research aim

The focus of the thesis is organizational risk management, and the overall purpose is to provide knowledge of how the new risk perspective can help and influence ERM.

The project will be divided into two parts. The first one, a scoping study, will serve to analyze the general characteristics of ERM. How and in which sectors ERM is implemented and ERM is lacking or represented in terms of the new risk perspective. In the second part of the thesis, the results generated by the scoping study will be compared and integrated in a case study of the ERM implementation carried out by Kraftringen. The case study itself will serve as an illustration of how ERM is implemented in a practical manner.

The research aim is to evaluate whether there are any key ideas within the new risk perspective that can complement ERM and how Kraftringen can utilize these key ideas in the development of their risk management process.

Research Objectives

1. Determine if, and in that case how, the practice of ERM can be improved using insights from recent development in risk management research.
2. Suggest how such improvements can be implemented in practice.

Research Questions

The research questions are formulated as:

1. *What is known within scientific literature regarding ERM and what part of the new risk perspective is already present or represented?*
2. *How can the ERM implementation at Kraftringen be improved with the results from the scoping study?*

Thesis structure

The thesis will begin with a scoping study, referred to as part one. The methodology and some limitations of the study will be explained and the study itself conducted. The results will be presented in separate sections depending on whether they are regarding general findings of ERM or aspects of the new risk perspective.

Following the results, discussions regarding the findings from the scoping study and a general discussion of the study will be presented. After the discussion, conclusions are presented.

In part two of the thesis, a case study of the ERM implementation at the company Kraftringen will be presented. Included in the section is also how relevant findings from part one can be used to either give scientific backing of existing practices and in some cases present enhance the ERM process at the company.

2 Scoping Study

The first part of the thesis consists of a scoping study with the intent to answer research question one and fulfill the objective of the thesis. First the scoping study methodology is explained, and the processes used presented.

2.1 Scoping Study Methodology

This section will provide a basis for the methodology used for the first part of the thesis. A scoping method was chosen for conducting a comprehensive research in the scientific literature regarding ERM and the new risk perspective. Following is a short presentation of what a scoping study is. Afterwards, a brief explanation the methodology is presented. And last, a more detailed description of the "six step framework" as presented by Arksey and O'Malley (2005) used to conduct the scoping study. Take note that only four of the six steps will be covered and used in the thesis.

2.2 Scoping study

The aim for the scoping study will follow the definition as presented by Daudt, van Mossel, and Scott (2013) "*to map the literature on a particular topic or research area and to provide an opportunity to identify key concepts; gaps in the research; and types and sources of evidence to inform practice, policymaking, and research"* (Daudt et al., 2013, p. 8). This definition of what the overall purpose of conducting a scoping study was considered suitable for the thesis.

Designed for attaining the purpose of the thesis's first part the scoping study will follow the four steps presented by Arksey and O'Malley (2005) on how to conduct a scoping study. The different steps will be presented below.

1. Identifying the Research Question
2. Identifying Relevant Studies
3. Study Selection
4. Charting the Data

Arksey and O'Malley (2005) stress upon the fact to not treat the process linearly. Thus, the process should be of an iterative nature and all of the above-mentioned steps must be reflected upon in order to reach a comprehensive methodology.

2.3 Scoping study limitations

There are certain limitations bound to the methodology of a scoping study. The balance between breadth and depth of the studied literature is stated by Arksey and O'Malley (2005) to be one limitation. Hence, the decision must be made if the study is supposed to cover all available literature or analyze a smaller number of articles. Since the field of ERM and the new perspective on risk management are developing fields in the scientific literature, a breadth of coverage was considered appropriate.

To secure the quality to some extent, only peer-review articles were included in the scoping study. Specific limitations are discussed further in section 2.8.2.

2.4 Scoping study: ERM literature

The different steps on how the scoping study was conducted will follow below.

2.4.1 Step 1: Identifying Research Question

Arksey and O'Malley emphasizes the importance of a broad research question. The following research question was chosen to incorporate as much information regarding the field of ERM and the new perspective on risk management as possible.

What is known within scientific literature regarding ERM and what parts of the new risk perspective is already present or represented?

To formulate the research question, a range of relevant articles were first studied to enhance and further develop the assessor's knowledge about ERM and the new perspective on risk management.

2.4.2 Step 2: Identifying Relevant Articles

According to Arksey and O'Malley, gaining a breadth of coverage regarding the literature prior the research question is positive (Arksey & O'Malley, 2005). By obtaining a thorough method for identifying articles a distinction can be made between 'database selection' i.e. where to search and 'search query identification' i.e. how to search, as recommended by Beerens and Tehler (2016).

Database selection

For conducting the research, the database Scopus (www.scopus.com) was chosen. The broad range of scientific fields suited the requirements of research regarding the thesis. Moreover, ensuring only peer-review articles were included in the scoping study.

Background literature review

Prior the scoping study a broad range of articles were studied to enhance the knowledge on the matter of ERM and the new perspective on risk. The articles were supplied by the assessor's supervisor.

Search Query Identification

From the background literature review the research question was formulated to get relevant articles that fit the purpose of the study. The aspects of "the new risk perspective" was retrieved and derived from the articles (Tehler, 2020) and (Aven & Ylönen, 2018). To find relevant aspects of the "new risk perspective" keywords were chosen to interpret the aspect itself without making the search string to precise. The keywords chosen to represent the relevant aspects of the new risk perspective and qualities of ERM is shown in blue and bold text:

- Uncertainties rather than probabilities should be a central aspect of risk. Probability is just a way of expressing or representing uncertainty, it does however have its limitations. Uncertainty was chosen to represent the context.
- Probabilities can be used to describe and characterize risk. However, it is important to know its limitations. Limitations, was chosen, in a way to find expressed limitations of working with sheer probabilities, but also limitations to the concept ERM in general.
- Every assessment of probabilities or even consequences is based on background knowledge. This can be more or less strong and comes associated with its own risk. This risk needs to be integrated and considered when analyzing results. Knowledge should be treated as justified beliefs and formulated as assumptions. Assumptions, beliefs and background knowledge.
- Background knowledge can be of more or less strength, even incorrect at times. The stronger the background knowledge, the stronger arguments in favor of the assumptions made. Argument.
- Surprises can and will occur relative to the amount of background knowledge. This is sometimes referred to as a "black swan scenario". Uncertainty was chosen over the term black swan not to yield too specific results.
- Risk assessment is the systematic process of identifying risk sources, hazards, threats and opportunities; to understand how these can occur and what their consequences will be. The determination of how to weigh a risk and its consequences in comparison to relevant criteria. Protective values were chosen to find context of how a risk affects a criterion.
- A risk analysis serves to inform a decision maker. Providing conditions to make an informed decision with respect to the limitations of the analysis, background information and aspects not covered by the analysis. Decision making were thus chosen as a search word.
- Cautionary (acknowledging the risk and its consequences) and precautionary (avoidance at all costs) principles play important roles in risk management to ensure that uncertainties are being handled. Resilience and robustness were chosen to represent the cautionary principle in corporate risk and uncertainty management.

Other aspects deemed worthy of interest from the background literature regarding ERM was the following:

- ERM being an all-encompassing method. Holism was chosen to study this aspect of ERM itself.
- To find results if the ERM concept increase the company value or performance. Performance was chosen.
- Since entities are not isolated components but an array of departments, individuals and operations in various sectors, caution should be taken into the growing complexity of the entity. Systemic was chosen to interpret how ERM deals with i.e. systemic risks and emerging properties.

To find all of the above mentioned in ERM context, the search results needed a boundary condition. Either ERM or Enterprise Risk Management was chosen as criterions for articles to be search results.

A search string was formulated to answer the research question. A Boolean approach was used to design the search string and is presented below.

("ENTERPRISE RISK MANAGEMENT" OR "ERM") AND (RESILIEN OR ROBUST OR HOLISTIC OR BELIEFS OR ASSUMPTION* OR SYSTEMIC OR ARGUMENT OR PERFORMANCE OR UNCERTAIN* OR PROTECT OR VALUES* OR LIMITATION* OR "BACKGROUND KNOWLEDGE" OR "DECISION* MAKING")*

By formulating a wide research question, a comprehensive amount of literature regarding ERM and the new perspective on risk were thought to be found. All in accordance with the recommendations given by Arksey and O'Malley. As previously discussed, the keywords Uncertainties, Black Swan, Holistic, Background knowledge, Limitations, Protective Values, Resilience, Robustness, and communication was chosen to represent aspects of the new risk perspective. The OR criterion was put between the keywords to prevent the search string from being to narrow.

A simple search for only the work ERM resulted in 7704 articles. The search results from the search string amounted to 1616 articles. Due to the nature of a scoping study further selections were required to receive a reasonable number of articles according to the scoping study framework (Arksey & O'Malley, 2005). This called for exclusion criteria to be applied to narrow down the number of articles.

1. Exclusion of articles regarding irrelevant scientific fields. These were:
   Medicine, Environmental science, Biochemistry - genetics and molecular science, Agriculture and biological sciences, Earth and planetary sciences, Physics and astronomy, Materials science, Immunology and microbiology, Pharmacology and pharmaceutics, chemical engineering, Neuroscience, Dentistry, Veterinary, Health professions, Nursing, Psychology.
   This criterion narrowed down the number of articles to 760.
2. By applying the inclusion criterion "only articles in English" and further exclusion criteria regarding the scientific fields e.g. exclusion of political, currency, electrical engineering, and environmental sciences, a number of 723 articles were gained.

2.4.3 Step 3: Article Selection

When no further exclusion criteria could be applied without the risk to overlook valuable articles, the decision was made to proceed with the title analysis according to the recommendations made by (Arksey & O'Malley, 2005). The title analysis reduced the number of articles to 382.

- Inclusion criteria regarding the abstract analysis was:
  - Articles including some kind of framework or method of implementation.
  - Deemed relevant in terms of the new risk perspective.
  - Deemed relevant to the sector.

Analyzing the abstracts of these articles, reduced the number to 80.

The articles were divided between the assessors. Due to irrelevancy some articles were removed. Irrelevant articles were mostly considered those that only measured some key indicator or increase in shareholder value in an entity currently using ERM. Some chosen articles were simply unavailable. A total of 37 articles were removed, either due to irrelevancy or being unavailable. This led to narrowing down the total number of articles to 43.

An overview regarding how the certain steps of the scoping study was carried out is presented in Figure 1 below.

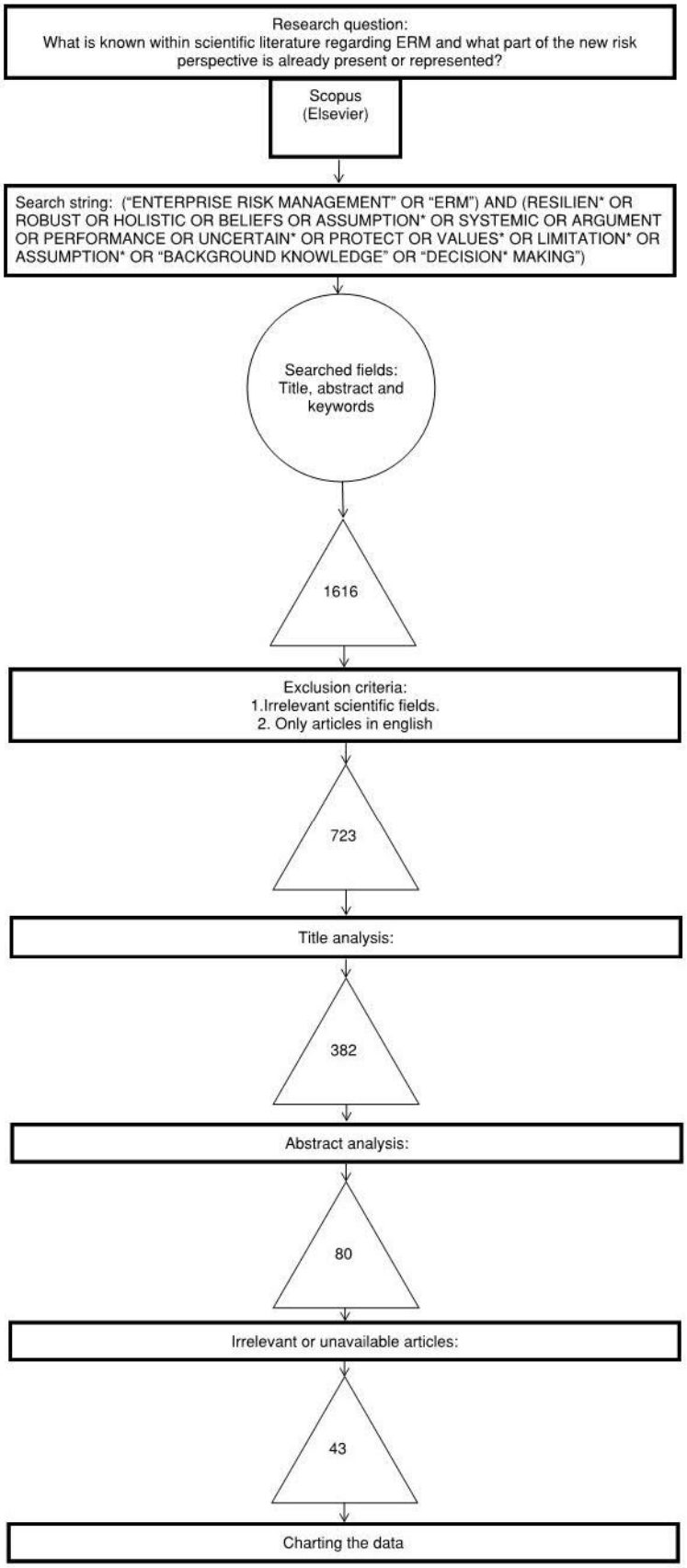

Figure 1 - Overview of Scoping Study.

2.4.4 Step 4: Results and analysis from Scoping Study

The results of the scoping study will be presented in the following two sections, and constitute the fourth step of Arksey and O'Malleys framework as in "charting the data" (Arksey & O'Malley, 2005):

- ERM in the literature; presented first are general statistics and information regarding the concept of ERM. The latter parts of the section consist of selected examples and representations of risk management aspects in the covered literature. Some general critique found in the literature will be presented as well.
- Frequency of the new risk perspective in the literature. This section covers statistics, occurrence and definitions covered in the studied literature. Examples of how these appear implicit and explicit will be covered and discussed.

2.5 Results: ERM in the literature

The section constitutes of findings in the scientific literature regarding what is known about ERM. Moreover, key aspects and examples regarding the view of ERM is presented. In section 2.6 results are presented regarding how the new risk perspective is integrated in the ERM literature. First, statistical findings from the scientific literature are presented.

Presented in Figure 2 is the type of risks managed in the scientific literature. In most of the studied articles, twelve cases, it is not specified which risks are supposed to be covered. In eight of the articles, the framework was all-encompassing, covering all risks. In five cases each, explicitly financial and IT risks were covered by the articles.

Figure 2 – Type of risks managed in the studied literature.

In Figure 3, the type of sector ERM was implemented or studied in is charted. Most literature, 17 articles do not cover a specific sector or even mentions what field to be applied in. Presented below are the articles that were able to categorize different sectors. Following is seven articles covering ERM studies in the financial sector and an additional seven which serves to be applicable in all sectors.

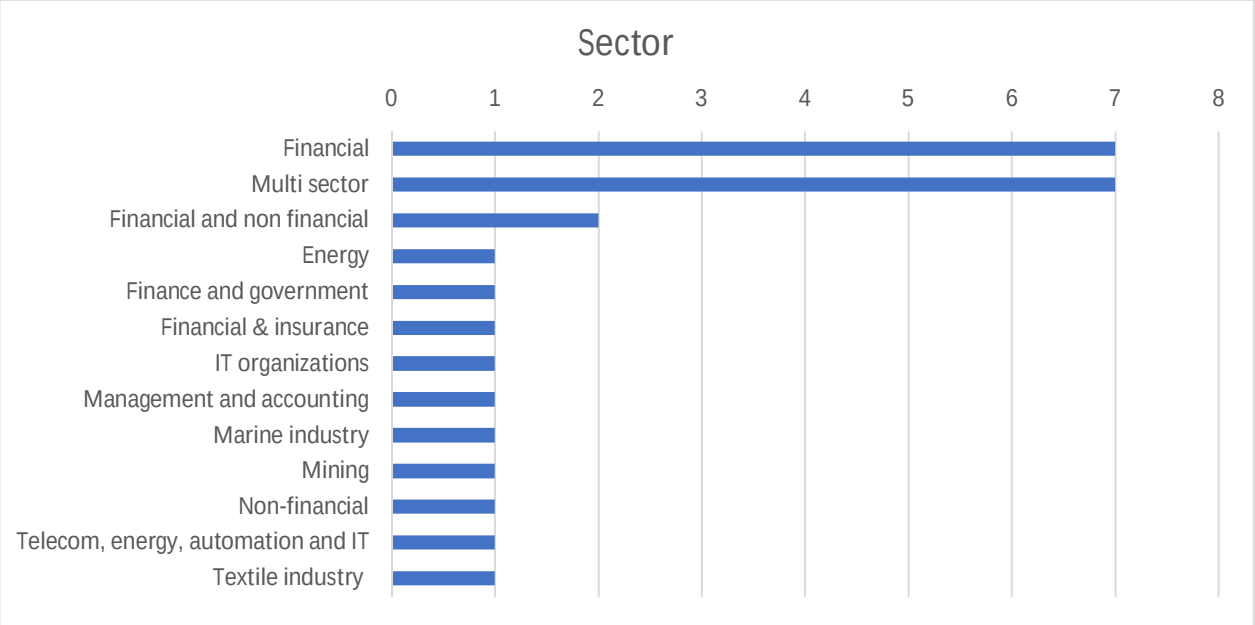

Figure 3 – ERM in different sectors of the studied literature.

2.5.1 Definitions of ERM

Below follows definitions and explanations of what constitutes the concept of ERM in the studied literature.

There is some consensus regarding the definitions of ERM. Examples from the studied articles define the concept as being holistic, top-down driven, and systematic, just to name a few. Furthermore, a consensus is that ERM is implemented by companies to align strategic objectives with the organizational structure. Which could be interpreted as a way of conceptualizing the risk management process. But the term is also somewhat ambiguous. Little or no coherence is reached in the practical implementation of the concept. Making it arbitrary for companies seeking to implement ERM.

The holistic aspect is described by several authors, for example in the articles (Gatzert & Schmit, 2016; Gifuna & Karydasb, 2010; Green, 2016; Lin, Wen, & Yu, 2012; Makarova, 2017), the authors define ERM as being a holistic tool for managing all company risks. In some cases, the holistic view of risks are supposed to be weighed in relation to company objectives (Gatzert & Schmit, 2016; Makarova, 2017). I.e. identified risks must be set in relation to objectives set by top management. Hence, ERM is considered being a tool for integrating company goals with its risk management process. A view supported by (Bogodistov & Wohlgemuth, 2017; Bromiley et al., 2015).

Further elaboration regarding ERM being a tool for companies to achieve strategic objectives is given by Burnaby and Hass (2009, p. 540) as the definition of ERM is presented being the activity of '…developing strategic corporate objectives that are measurable, identify risks that would prevent accomplishing these and third, identify controls to mitigate those risks' (Burnaby & Hass, 2009, p. 540). ERM bringing strategic value for a company can be seen as a general theme within the scientific literature. As mentioned by Agarwal and Virine (2018), ERM should create a uniform view of risks and align these with an organization's operations. The process should be integrated within all layers of an organization as it serves different functions. Strategic (long-term) and day-to-day decisions should be supported by the ERM framework (Agarwal & Virine, 2018, pp. 297-300).

Other descriptions of the concept are presented by Arena, Arnaboldi, and Palermo (2017) and (Tekathen & Dechow, 2013). ERM according to beforementioned, should be an inclusion of a wide range of activities, functions under a common umbrella and set these in relation to organizational ends e.g. value creation and target achievements (Arena et al., 2017, p. 67). The view is supported by Tekathen and Dechow (2013) as ERM is considered including a wide range of activities, making it an integrated part of strategic objectives. This can be linked with the above stated definitions.

Rather than ERM being holistic or a tool for strategic success other authors state ERM is mainly for compliance, for example Kurdi, Naji, and Naseef (2019) and Agarwal and Virine (2018) argues that the compliance factor is for making the reporting structure of the company clearer. Rather than finding a coherent view defining the concept as being e.g. holistic, top-down driven, a tool for strategic objectives. The scientific literature is ambiguous in its definitions of ERM. As stated by Jankensgård (2019) ERM can be whatever the practitioner wants it to be, which ultimately could make the concept meaningless (Jankensgård, 2019, p. 566).

Another perspective complementing and bringing several of the above-mentioned definitions together is presented by (Lundqvist, 2014b). ERM has developed as a coping-mechanism for companies to compile as pressures have increased on them demanding a functional risk management process. Lundqvist identifies four pillars of ERM that are essential for implementing ERM in an effective way. Hence, a company must have:

1) General internal environment and objective setting
2) General control activities and information and communication
3) Holistic organization of risk management
4) Specific risk identification and risk assessment activities

(Lundqvist, 2014b, pp. 394-395, 413)

2.5.2 Risk assessment in ERM

As stated by Bogodistov and Wohlgemuth (2017) ERM applies the usual tools and techniques associated with risk management i.e. assessments and handling of risks. These are discussed in the following parts in the context of ERM.

Risk assessment is an important part of any risk management process. As mentioned by Gatzert and Schmit (2016), risk assessments encompass several activities e.g. risk identification, measurement, evaluation and response and also monitoring. In the context of ERM the assessment should be holistic, and all threatening events should be taken into consideration. What the assessment process is supposed deliver is a sense of the exposure to risks, opportunities and challenges facing and organization (Gatzert & Schmit, 2016).

Mainly, ERM is supposed to aggregate all the risks facing a company as mentioned by Gatzert and Martin (2015, p. 32). By doing this, the authors imply interdependencies between risks are covered which would allow for a better assessment of the company risk profile. And by having a better risk profile, improvements can be made in the decision process in respect to strategic and operative objectives (Gatzert & Martin, 2015).

Several authors, for example (Gatzert & Schmit, 2016; Lundqvist, 2014b) differ in what parts constitutes ERM. Lundqvist (2014b), as mentioned in 2.5.1, define four pillars relevant of implementing ERM, risk assessment as being one of the identified pillars. In the same article Lundqvist derive the eight parts of the COSO framework, as follow:

1) Internal environment which pertains the governance and structure, culture, and philosophy of the risk management.
2) Strategic objectives of the firm's operation which includes reporting and compliance activities.
3) Event identification which involves determining significant events that may affect the company's ability to achieve its objectives.
4) Risk assessments focused upon the quantification of risks that might hinder a company to achieve its objectives.
5) Risk response, how to act when facing a risk e.g., avoid, reduce, accept, or share the risk.
6) Control activities, policies, or documents to ensure identified risk responses are carried out.
7) Information and communication have the purpose of interlink every component together.
8) Monitoring the process, to secure that each process is working properly

(Lundqvist, 2014b, p. 396). Gatzert and Schmit (2016) on the other hand identifies different parts than Lundqvist and COSO. Namely:

1) Risk strategy
2) Risk assessment
3) Risk governance and
4) Risk culture.

Regarding what parts should be included in the ERM process, the literature again show ambiguity. The most referred ERM framework in the literature studied is presented by COSO, as presented in Error! Reference source not found.. The COSO framework constitutes of 8 pillars which are discussed by Lundqvist (2014b, p. 396). Risk assessment having the function of focusing upon the quantification of risks that might hinder a company to achieve its objectives (Lundqvist, 2014b, p. 396). But some critique to the COSO framework can also be found. Hence, doubt can be raised on the relevance of the components. Lundqvist (2014b) identifies four pillars of a successful ERM implementation and Gatzert and Martin (2015) identifies a different set of tools as important for ERM. If one is to believe the above-mentioned examples it can lead to false beliefs that "if we just carry out these steps" a functioning ERM process is attained. Which might not be the case. If a company is not cautious in its implementation of ERM it might only serve as a discipline without substance.

2.5.3 Risk Culture and objective setting in ERM

In the studied literature many articles bring up the importance for companies to have a sound risk culture in order to have a functional ERM process. Below follow general examples to enhance the meaning of risk culture covered in the ERM literature.

Several authors, for example (Agarwal & Virine, 2018; Gatzert & Schmit, 2016; Stoll, 2015) state the importance of having a sound risk culture in order to gain a functional ERM process. Coherence is in that sense reached. But some authors differ in their opinion regarding what value the risk culture bring. (Agarwal & Virine, 2018; Stoll, 2015) explicitly mentions the importance to infuse a risk-based mindset for enhancing employer's ability to take on risks in an informed manner. Thus, there are incentives that risk culture might affect the employer's decision-making. This is also supported by Gatzert and Schmit (2016) as risks should be considered and undertaken on an informed basis, making the entire organization deal operations through a coherent view on risks.

The main responsibility of infusing the appropriate risk culture by communicating within the company is a responsibility for top management (Stoll, 2015), which also is supported by (Agarwal & Virine, 2018). Moreover, it plays a part in the formulation of what risk appetite a company should have (Beasley, Branson, & Pagach, 2015). Apart from top management bearing the main responsibility for setting and communicating the desired risk culture within the company, very little is said on how to practically do this. It could be interpreted that the main foundation is a clearly stated objective formulated by top management and then communicated through company channels for reaching a coherent view regarding risks.

2.5.4 Risk identification in ERM

Below follow examples regarding risk identification methods in the covered ERM literature.

The literature shows some ambiguity regarding the identification of risks. Some scholars, for example (Green, 2016; O'Donnell, 2005) state listing possible events that affect an entity's objectives is a proper way to identify risks. O'Donnell (2005) goes a bit further and explain that by creating a value chain map a company can gain a holistic view of its risks. Thus, both authors present the idea to identify special risks, so called "key risks".

Another view of risk identification is presented by Abkowitz and Camp (2017) as the authors present a framework to overcome the difficulty to comprehend the holistic view and systematic approach to ERM. Risk identification in ERM is measured in how well the company can answer to "the risk triplet" i.e. what can go wrong, the likelihood of an event and its consequences (Abkowitz & Camp, 2017).

To the above-mentioned views, critique is delivered by Bogodistov and Wohlgemuth (2017). The authors problematize the action of "listing events", stating it has too much focus on ex ante identification, thus being an uneconomic alternative since it is impossible to list all events that might affect an entity. Instead, companies should include both ex ante and ex post identification (Bogodistov & Wohlgemuth, 2017). The perspective should be lifted beyond the sheer identification of risks for the sake of producing lists and heat maps, and include, building organizational resilience as a mitigating capability of handing risk ex-post. This could be considered as a more comprehensive way of handling the identification of risks. Similarities can also be found in (Green, 2016; O'Donnell, 2005) as the authors stress upon identifying "key risks" as Bogodistov and Wohlgemuth (2017). The difference that the latter use another criterion called These are: valuable (V), rare (R), inimitable (I) and non-substitutable (N). A more detailed description follow in the next section.

2.5.5 Hybrid models for enhancing ERM

Some scholars present different models, inspired and adapting aspects from other scientific fields, as means to complement ERM-frameworks. A selection of the models found in the studied literature will briefly be explained below and enhanced with examples in showing how they might improve ERM.

Rodriguez and Edwards (2015) state the need of introducing knowledge management with risk management to create "true" enterprise risk management. The authors define knowledge management as "*the systematic, explicit and deliberate building, renewal, and application of knowledge to maximize an enterprise's knowledge-related effectiveness and returns from its knowledge assets*" (Rodriguez & Edwards, 2015, p. 46). Rodriguez and John Edwards (2015) reaches the conclusion that the perceived quality of risk knowledge sharing is a variable that influences risk control the most. By sharing risk actions, decisions and experience, an increased awareness and warning signals enhance the risk control process (Rodriguez & Edwards, 2015, p. 58).

System theory, as will be further discussed in 2.6.3-Holistic, is found by the authors Lee and Green (2015) to enhance ERM. ERM according to the authors often just aggregate individual risks and miss out key properties of the systemic risk itself. Understanding the interactions between the elements in the system, holism, emergence, and synergy provides a better risk management. Holism is already partially integrated within the COSO ERM framework.

Bogodistov and Wohlgemuth (2017) introduces the resource-based view and dynamic capabilities to enhance the concept of ERM. The concept of ERM according to the authors is still lacking in conditions, an overarching framework, and basic casualties. The authors identify the need for scholars and practitioners having a framework that will aid them in identifying potential risks, how to deal with them, how to deal with their uncertain occurrence and finally how to identify their impact through a chain of causality (Bogodistov & Wohlgemuth, 2017). According to Bogodistov and Wohlgemuth (2017) a company should fulfill certain resources for achieving a sustainable competitive advantage.

The previous mentioned criteria (VRIN) are stated by the authors as being the "holistic pillars of ERM" (Bogodistov & Wohlgemuth, 2017, p. 235). The authors argue for the increased benefits dynamic capabilities bring ERM. Specifically, it enhances the view from preventing events and more towards building organizational resilience. An ex-ante, before the event, preparation and risk identification of risks are uneconomic. Instead, building organizational resilience would benefit a company regarding the ability to respond to unanticipated events, develop its capacity to seize opportunity and the ability to transform the resource base of the firm accordingly. Thus, ERM can be developed to adapt successfully once an unlikely event occur (Bogodistov & Wohlgemuth, 2017).

The problem formulated by some scholars as "…the need to identify their supply chain vulnerabilities and target the capabilities that need to be strengthened" (Bogodistov & Wohlgemuth, 2017, p. 241). Which directly interlink with the previous statement of ex-ante identification. The problem remains the same with an indefinite number of risks to handle. The authors call for both ex-ante and ex-post for handling risks and present their framework as showed in Figure 4 below. The risk management capability is concerned with the risk management process at the strategic and operational level. At the strategic level risks should be evaluated from the VRIN-criteria. First, dynamic capabilities allow for a dynamic reassessment of VRIN related risks in accordance with environmental dynamics. Second, dynamic capabilities allow for risk resilience at the strategic level and the operational level. Both high and low priority risk are handled using risk management processes but in a different order, VRIN-related risks should be prioritized first (Bogodistov & Wohlgemuth, 2017).

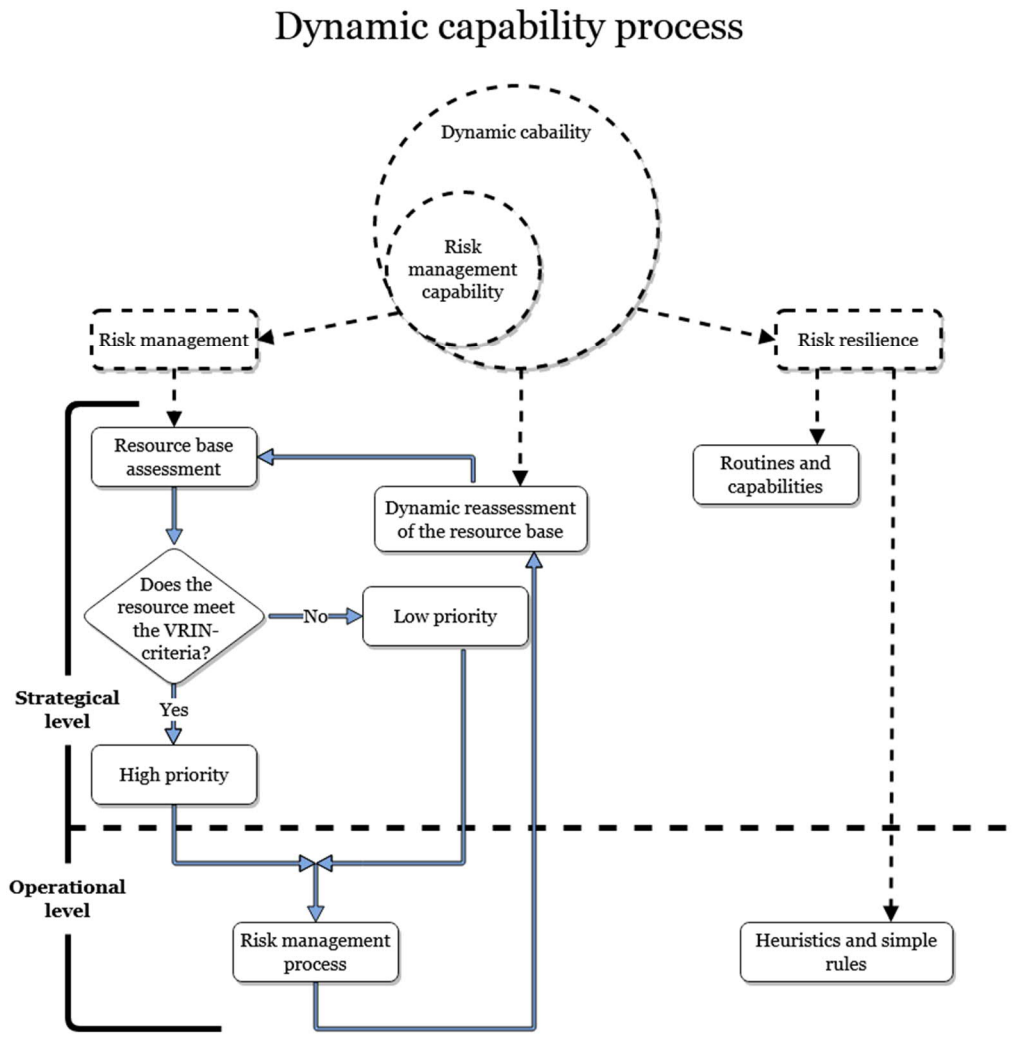

Figure 4 - Dynamic capability process. Illustration adapted from (Bogodistov & Wohlgemuth, 2017)

The risk management capability is seen as a part of the broader dynamic capability concept, in Figure 5 a flowchart is presented by Bogodistov and Wohlgemuth (2017) in how to handle risks at the operational level. It should be noted that the system is supposed to work for VRIN-related risks i.e. risks that are high-priority and could have a major impact on the company. If a risk is set as high-priority it needs to be managed first, as presented on the left-side of the flowchart, and be avoided if possible. Otherwise the risk should be mitigated or transferred and lastly accepted only if no other options are valid (Bogodistov & Wohlgemuth, 2017). What negative consequences the avoidance-option could bring are not discussed by the authors. However, Bogodistov and Wohlgemuth (2017) is mainly concerned with risks that could bring a highly negative impact on a company. Hence, VRIN-related risks should be avoided as reasonable possible.

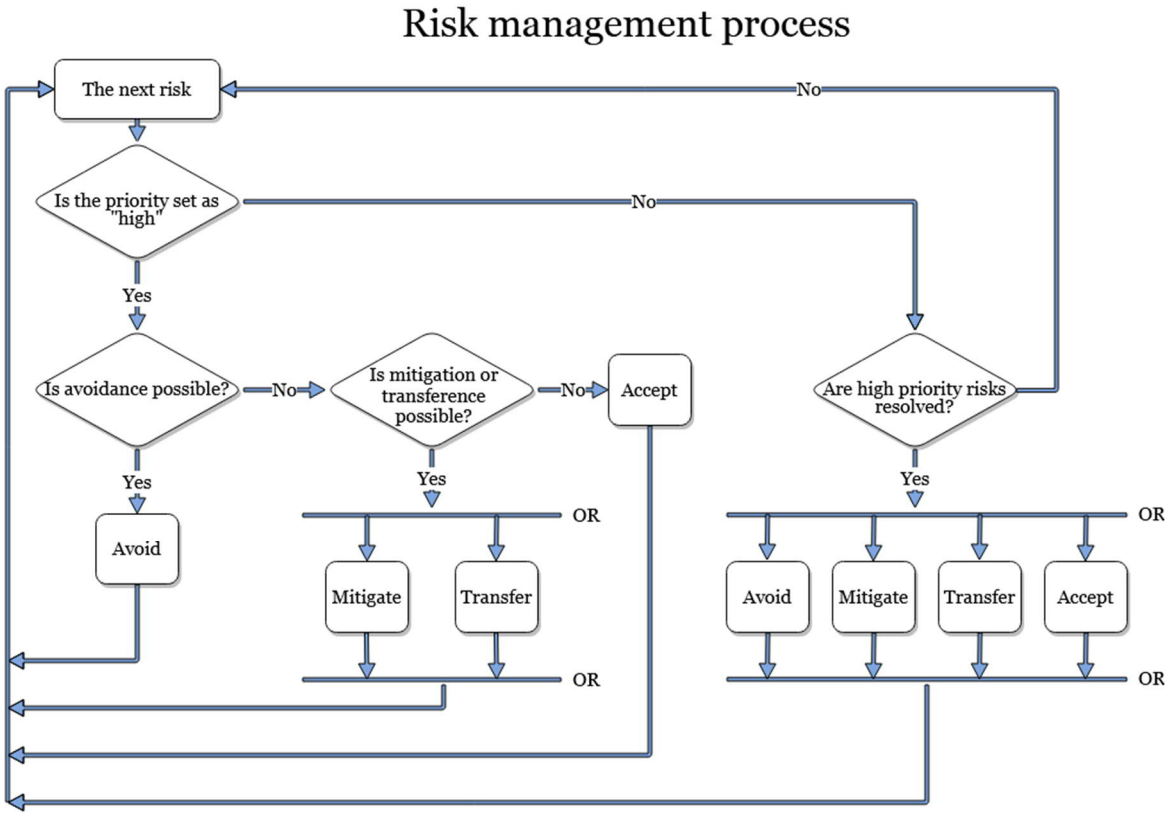

Figure 5 - The risk management process illustrated in a flowchart. Illustration adapted from (Bogodistov & Wohlgemuth, 2017).

Bogodistov and Wohlgemuth (2017) elaborate on risk management at the operational level. As they bring up the matter of ad-hoc risk management as a helpful tool, especially for responding to unforeseen events if there are simple rules available. At the same time, Bogodistov and Wohlgemuth (2017) argue that ad hoc is associated with the silo-based perspective of risk management rather than ERM. But it can work as a way for organizational learning. Once an ad-hoc solution has been applied to an event it can be adopted and later applied in future VRIN-related risk assessments (Bogodistov & Wohlgemuth, 2017).

Some of the scientific literature state ERM is centric regarding ex ante preparation and risk identification, for example (Green, 2016; O'Donnell, 2005). A response is made by Bogodistov and Wohlgemuth (2017) as dynamic capabilities could adjust ordinary routines to a changing environment. It can be stated that almost no process is static. Hence, building a risk management process within a company taking this into account would certainly be a good thing. But questions can still be raised regarding which hybrid model to apply, if any. Securing a process where a uniformed judgement regarding risks would be preferable. As presented by Rodriguez and Edwards (2015), knowledge management could influence the perceived quality of risk knowledge sharing which arguably should be central to any risk management process. Namely, on which basis judgements, identification, assessment is based upon is often neglected. Hence, risk knowledge sharing could enhance what knowledge-basis drive the process, possibly making the control process regarding risk management more coherent.

2.5.6 Critique and flaws of ERM

ERM is not without flaws and shortcomings. Following are some examples of the critique against ERM found in the covered literature presented.

Nielsen and Pontoppidan (2019) deliver some criticism towards ERM gathered from an array of literature. Some of these points are:

1. ERM might embed its practitioners in what is referred to as “the illusion of control”. Formalized guidelines and standards stemming from a foundation of regulatory compliance is not giving enough attention or inclusion to real, physical, safety or hazard related risks. The authors also continue to state that effective risk management is connected to circumstances, context and that characteristics of the industry which shape both accounting and organizational practices. The bottom line is that one single risk management system is not a “one size fits all”.
2. It cannot be assumed that risk is defined and uniformly understood in the entire entity since there are variations in individuals cognitive, social, and cultural aspects of risk. There is thus, a need of understanding the behavioral dimension in risk management as well as considering the context, internal and external of the organization.
   (Nielsen & Pontoppidan, 2019, pp. 4-5).

Other authors, for example Schiller and Prpich (2014) point to the potential weakness of ERM assuming all risks are able to be expressed in financial terms. This, according to the authors is not appropriate or at times possible in organizations of complex risk portfolios that affects several stakeholders. The subject of “incommensurability” is brought up, the problem being the “absence of a common unit of measurement across plural values”. Each value might be valid from each objective view of the stakeholders, but actions to protect these might be incompatible with the others (Schiller & Prpich, 2014, p. 1004).

The authors also point out the differences in implementations in-between firms, the reason for this is suggested to be because ERM:

- Reduces risk to probabilities and impact.
- The above-mentioned issue of commensuration, which does not add anything useful.
- Implies comprehensiveness that is not obtainable or practical.
- Is insensitive to organizational context.

(Schiller & Prpich, 2014, p. 1001).

Lundqvist (2014b) bring up several points of criticism to the concept of ERM. Most important is the critique facing the ambiguity surrounding the concept. According to Lundqvist, this leads to inconsistencies in its implementation. Lundqvist derives this to the ambiguity surrounding the term i.e. what really constitute the ERM concept is not clear (Lundqvist, 2014b, p. 397).

Ashby, Buck, Nöth-Zahn, and Peisl (2018) points out the lack of knowledge creation and gathering within academic ERM literature, as it has been left out to the individual organization to appoint stakeholders for the task. Moreover, Ashby et al. (2018) points to one limitation of ERM as it is seen as rather reactive and relies on incomplete and historical knowledge. The authors state that ERM is mostly focused on managing what we know rather than what we do not know (Ashby et al., 2018). This critique can be linked to section 2.5.5-Hybrid models for enhancing ERM as Rodriguez and Edwards (2015) stress the need for bringing knowledge creation as a part of companies' risk management processes. Thus, a need of organizational learning (Rodriguez & Edwards, 2015, p. 58).

Rather than focusing on ambiguity or knowledge, Beasley et al. (2015) suggest that an organization might merely adopt the basic elements of the ERM process. The authors state that this depends on solely on external requirements and the existence of conceptual frameworks and other best practices (Beasley et al., 2015). In other words, ERM becomes a just "a tool for compliance" and have little strategic value. This in turn might result in an incomplete management of uncertainties as well as not being able to address risks not identified by the entity or the system. Similar is stated by Tekathen and Dechow (2013), the problem with the COSO framework not addressing uncertainties properly. Moreover, the arbitrary ERM system generates a rather ambiguous understanding of risk management (Tekathen & Dechow, 2013).

2.6 Results: Frequency of the new risk perspective in the literature

In the next section focus is shifted towards how the new risk perspective is integrated in the scientific literature surrounding ERM. Certain definitions, highly associated with the new risk perspective have been extracted and analyzed from the studied articles in order to investigate what definitions are already present, or which are needed for possibly enhancing the concept of ERM.

The results from the scoping study can be seen in Figure 6. Each topic is represented by either being expressed explicit, implicit, or not mentioned at all.

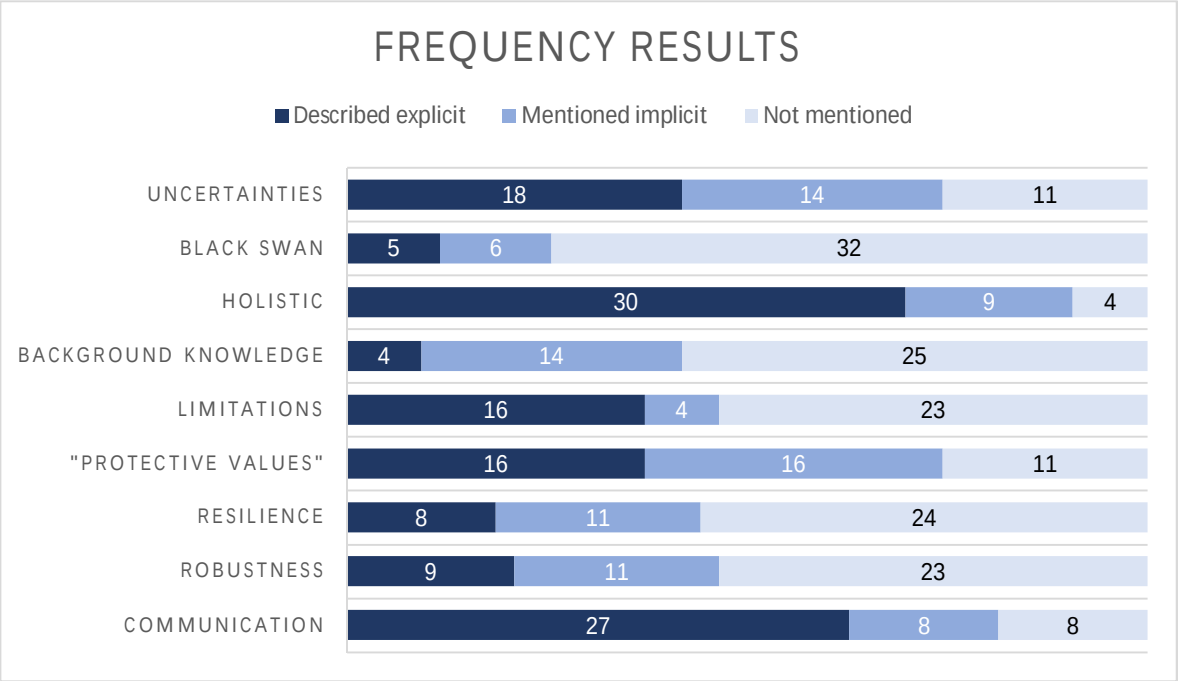

Figure 6 – Frequency of the occurrence of "The new risk perspective" in the 43 covered articles of the scoping study.

Each topic will be covered in the following subsections. At the beginning of each subsection a brief definition will be given of each topic followed by the frequency, implicit or explicit. A summary of the results will be discussed and after that, examples of how the terms are expressed and used will be presented.

2.6.1 Uncertainties

The definition of the term “Uncertainties” was used as expressed in (Aven, 2011). Uncertainty, simply put, refers to the following: not knowing whether an event will occur or not, not knowing the consequences and not knowing the severity of the outcome nor consequences (Aven, 2011, p. 518).

Frequency:

The occurrence of the aspect uncertainties is illustrated in Figure 7. In the 43 covered articles it is described explicit 18 times, mentioned implicit 14 times, and not mentioned or covered at all eleven times. The term appears with various meaning and in different context throughout the literature. The term is described as an issue to deal with, an aspect of probability or the dispersion of an outcome. The term itself is also sometimes used as a synonym to risk, an emerging property due to complexity, the effect of external events beyond control, insufficient amount of knowledge and normatively as something that ERM is the solution to.

Occurring in 32 of the 43 articles, the term is not to be considered as something missing in the ERM literature. What is missing however is coherence of the term. This could be the effect of using the term in such different context such as the spread over sectors and types of risks managed.

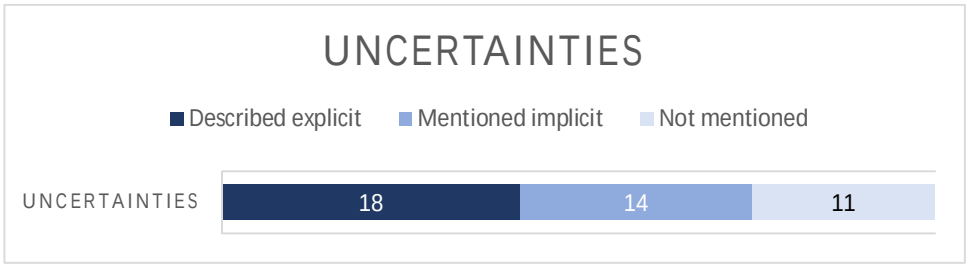

Figure 7 – Uncertainties expressed in the studied literature.

Explicit results:

The authors (Hassler, Andrews, Ezell, Polmateer, & Lambert, 2020), is considered to explicit address the issue of dealing with uncertainties in complex systems through the framework presented in their article. Probabilities are gathered and extracted from the opinions of experts and specifically raises the issue of bias, emerging and future conditions.

Various hands on techniques to deal with uncertainties are presented in the article (Sidorenko, 2019). These include the use of scoring, scenario analysis, stress testing and simulations. Other than that, the article itself only covers the subject of ERM in terms of developing a "basic risk management document". This ERM document, according to the author, should mainly consist of ISO 31000 with selected parts borrowed from the COSO: ERM 2017 framework (Sidorenko, 2019, p. 12). Additional solid examples can be found in an article from 2012 by De Souza et al. The authors explicitly express how non-financial firms have different uncertainties than financial firms.

Specifically, De Souza et al. state the quantification of risks becomes more complex and isolated for non-financial firms. The authors exemplify this by the rationalization that "the risk of a project", has several sources of risk and uncertainties e.g. the project itself, competition, changes in industry, international and macroeconomic consideration. Which can affect the outcome of the project (De Souza et al., 2012, p. 280).

In the article (Arena, Arnaboldi, & Azzone, 2010), uncertainty is expressed explicit in the ERM implementation example of an Italian telecommunications company. The statement is that uncertainty is handled by IT risk management and operational planning (Arena et al., 2010, p. 666). Its conducted by first, a discussion about what might affect the target goals, adjustments to the budget are then conducted and forecasts integrate with risk analysis. The results are presented in several scenarios, usually the worst and best case. The steps are however not formal or covered in any documents. These scenario analyses are only evaluated by the management control unit without the involvement of managers and ERM experts. Uncertainty is finally described as the unexpected events on financial performance (Arena et al., 2010, p. 666).

A normative approach is described in the article (Althonayan & Andronache, 2019). The term uncertainty is expressed explicitly only as an aspect that ERM is a solution to (Althobaiti & Aloraini, 2019, p. 2). Uncertainties is treated the same way in the article (Mensah & Gottwald, 2015). The term uncertainty is mentioned several times in the text by the authors. Explicitly, managing uncertainty is discussed as a part of a risk management process which is essential to organizational success (Mensah & Gottwald, 2015, p. 8). Makarova explicitly mentions the term uncertainty in an article from 2017 where the author state that the most promising way of protection against and handling uncertainty, for reaching company goals, is to apply the three lines of defense model. Furthermore, Makarova brings up the importance of "key indicators" as an important part of a company's assessment in the face of uncertainty (Makarova, 2017, pp. 132,136).

In (Schiller & Prpich, 2014), the term uncertainty is expressed explicit, among ignorance and ambivalence, as something that cannot be expressed as probability times impact. Taken out of its context, the section of the article is pointing out the normative notion of ERM considering risk transfer, acceptance, and transfer while ERM also is failing to compare and commensurate risks among stakeholders. Additional coverage of uncertainties states that companies generally are and should be interested in investigating "known unknowns" and "unknown unknowns". This subject, according to the authors is poorly handled since ERM frameworks only handles risks regarding objectives and strategies of organizations (Schiller & Prpich, 2014, p. 1003).

Uncertainties are described in an article by Bates, Filippini, Lai, and Lau (2012) as something that can affect an organizations operational environment. Furthermore, uncertainties are explicitly described as events that are unpredictable and would occur instantly. The authors give examples of these "uncertainties" that can threat a business as a financial crisis, terrorist attacks or a natural disaster. Hence, these threats are sudden and can threaten business operations in long- and short-term effects (Bates et al., 2012, p. 665). Manifestations of uncertainties appear in the article (Stoll, 2015). Here, Stoll explicitly mentions the term uncertainty several times. It is said that handling uncertainty is one key factor for a successful implementation of ERM. Moreover, Stoll mentions uncertainty as a growing part of any organization as it comes from several directions e.g. financial, political movements, extreme nature events, pandemics etc. Stoll also state by managing uncertainty in a coherent way across an organization will contribute to better risk information and awareness within the organization (Stoll, 2015, pp. 9-11).

A slightly different description, more similar to subjective bias, is found in (Tekathen & Dechow, 2013). The authors state the subject of how risk reporting systems are imbedded by uncertainties i.e. that different people report potential risks (Tekathen & Dechow, 2013, p. 107).

In the article “Emerging IT Risks: Insights from German Banking” the authors explicitly discuss the term uncertainty. One research questions in an article are formulated as “*When is an uncertainty understood to be an emerging risk?”.* The authors touch upon the academic definition of uncertainty and its relations to a system view. In this view, uncertainty is a result of a complex system where appropriate knowledge is not gained about the systems variables and their interactions within that system. The term uncertainty is linked to knowledge management, whereas a company can rely on enough data and the risk managers have a uniform understanding of risks a quantitative risk management approach is suited. But, if there is a lack in data or knowledge risk management must gather knowledge (Ashby et al., 2018). A similar approach is taken when Green mentions the term uncertainty (Green, 2016). Explicitly, Green conceptualize about probabilities and likelihood. Green state that a limit in knowledge leads to uncertainty. Furthermore, Green stresses the importance of not taking quantitative scales as measurements of probability, they are simply quantifications of it. Continuing the subject of knowledge, in the article (E. Rodriguez & J. S. Edwards, 2015), the authors explicitly mentions the term uncertainty as lack of knowledge. In return, knowledge will reduce uncertainty. The authors also point out that managing risks is not a question of a lack of information, but rather a lack of knowledge how to interpret the meaning of the information.

The term uncertainties are explicitly mentioned and elaborated in an article by Bogodistov and Wohlgemuth (2017). The authors deliver some critic on previous research to mainly have focused on the estimation of probabilities based solely on previous experience. Instead, the authors insist on more focus on dynamism, the unpredictability of the environment and implement necessary routines to handle them. Furthermore, the authors state that there are without doubt a need for handling uncertainties surrounding, especially, the risk identification phase. Hence, uncertainty and unpredictability need to be thoroughly evaluated through capabilities to deal with uncertainty. Instead of focusing on creating long lists of “all possible risks” (Bogodistov & Wohlgemuth, 2017, p. 238).

Implicit results:

In the article (Rana, Wickramasinghe, & Bracci, 2019), it is mentioned implicit how to handle uncertainties by complementing quantitative approaches with qualitative approaches when statistical data is not available (Rana et al., 2019, p. 149). Abkowitz and Camp (2017) implicitly describe the term uncertainties as complexity of the environment. The authors state as the world of risk is increasing in its complexity due to factors that might influence business operations such as: global competition, dependency on international supply chains, climate change and technical innovations (Abkowitz & Camp, 2017, p. 79). Similarly, Gatzert and Schmit (2016) implicitly describe the term in the context of successful risk management process, a process that must be proactive in the sense of anticipating events that have not yet occurred (Gatzert & Schmit, 2016, p. 34).

2.6.2 Black swan

The description of “Black swan” or “Black swan scenario” will be in line with the description from the author of the book “The Black Swan: the impact of the highly improbable” (Taleb, 2007). A “Black swan” is an event that is characterized by being: Unpredictable, massive in its impact and afterwards appearing less random.

Frequency:

The least occurring concept in all the studied literature. As show in Figure 8, the term is mentioned explicit five times, described implicit six times, and not being addressed at all in 32 of the articles.

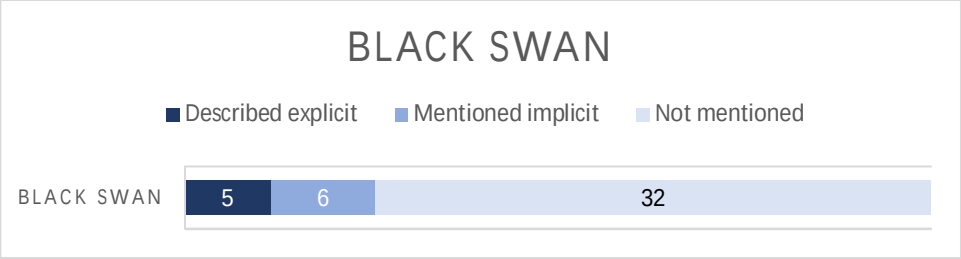

Figure 8 – The occurrence of the concept black swan.

The results are within a narrow span in terms of definition and usage. The explicit results range from scenarios and risks human minds cannot imagine, human minds inability to predict randomness or simply low probability high impact scenarios. The implicit results are more descriptive; as screening for new unknown hazards, as unnoticed risks or being the effect or routinized risk management.

This is arguably the most lacking part and missing aspect of the new risk perspective in all the studied ERM literature. This term that ought to be more reoccurring if ERM is to be a response to spectacular events such as the financial crisis of 2009, which described by some, was the inability to foresee unimaginable events. Referred to in 2.5.6 - Critique and flaws of ERM, is the statement that ERM might embed “the illusion of control”, by managing and owning all identified risks facing an entity, could it be that ERM possibly breeds black swan scenarios by putting too much effort into only managing know risks in the comprehensive portfolio?

Explicit results:

In the article (Jankensgård, 2019), its stated that the inability to see the big picture of the risks a firm is exposed to is one of the key factors of the financial crisis of 2007-2009. It also states that managers often "undermanage" risk of low probability and high impacts, while at the same time overmanages risks of high probability and of high salience (Jankensgård, 2019, p. 566). The author refers to this as "The agency problem of corporate risk management". The article even uses the term "Black swan" and compares this to the agency problem and the human minds inability to predict randomness or highly unlikely events (Jankensgård, 2019, p. 573). Implications can be found in (Lee & Green, 2015), where the authors raise a central problem in risk management, that "human beings are not good at visualizing a world they have never seen". The recommendation to deal with the issue is to have those responsible for risk management to "think outside the box" regarding assumptions and future events. Practically doing this by conducting brainstorming, scenario planning and using risk scorecards (Lee & Green, 2015, p. 200). This decision-making approach is followed in (Arena et al., 2010), where the term black swan is normatively covered in the conclusion of the study. The authors state that "better forecasting moves ERM from being a black box of risks and solutions, to a process of that potentially prepares managers for a Black Swan" (Arena et al., 2010, p. 673).

Stoll (2015) explicitly mentions Black Swan events as an event that carry low-probability and a high-impact. These events are very hard, if not, impossible to foresee. But, depending on how uncertainty is handled it can equally be an opportunity as much of a threat (Stoll, 2015, p. 9).

Implicit results:

The author Amin (2019) mentions the role of experts as an implicit response to dealing with black swan scenarios. The implicit reference is "continuously screening the environment for new hazards, which may not be on the radar screen today, but can become a threat to the organization in the future". The role of these experts in the risk management process in handling cyber security risks is to monitor: changes in risk management tactics, controls, new polices being introduced, insurance coverage, mitigation measures and the responsiveness of management to threats (Amin, 2019, p. 38)

Abkowitz and Camp (2017) mentions that ERM might not capture risks that are “outside of the box”, and that key risks might go unnoticed because they are not directly linked to the operating environment (Abkowitz & Camp, 2017, p. 79). Similar reasoning is carried out in (Bogodistov & Wohlgemuth, 2017). The authors claim capabilities and routines of a company are restricted to blind spots and cannot identify all systemic risks. Also, there exists risks that are non-systemic, force majeure events that will not be identified by a routinized identification process (Bogodistov & Wohlgemuth, 2017, p. 244). Furthermore, Bogodistov and Wohlgemuth state that the capability-based perspective can handle unforeseen events, black swans, and how organizations can cope with such events. The authors state that there will always be events that are impossible for an organization to foresee. Moreover, events with low-probability and high-impact will make *ex-ante* of each uncertain event an economic disaster. The authors advocate on applying a dynamic capability-based perspective in handling those events (Bogodistov & Wohlgemuth, 2017, pp. 235-236).

2.6.3 Holistic

ERM is described to be a framework for managing all risks in a risk-portfolio unique to the company. The risks included ranging from financial, operational and safety-risks. The definition of holistic is defined from the executive summary of COSO-ERM framework. As to address the multiple different risks that affects different parts of an organization (COSO, 2004).

Frequency:

The occurrence of the term “holistic” from the studied scientific literature is presented in Figure 9. Of 43 studied articles, it was explicitly described in 30 articles, implicitly mentioned in nine articles, and not mentioned at all in four of the studied articles.

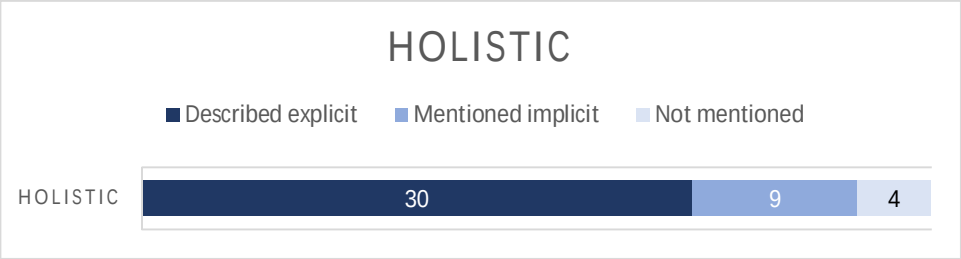

Figure 9 - Occurrence of the term "holistic" in the scientific literature.

The term holistic is the most represented term of the new risk perspective in the studied ERM literature. The usage is fairly coherent. The most common context is in framing the multitude of risks facing the company. I.e. “ERM is holistic since ERM covers operational, financial and environmental risks”. After that holistic is widely used as an adjective to the framework itself, such as ERM is a holistic framework. The main difference is thus if holistic is being used in terms of multitude of risks or in ERM being a holistic framework covering an entire entity.A few examples pierce the normative depicturing of the term and claims that ERM only becomes holistic if it manages to break cultural, functional, or departmental barriers. Another example is that holism is only achieved with participative leadership. A contradicting view is found in the critique in (Lee & Green, 2015), where the authors claim that ERM in fact is not holistic since it only serves to aggregate risks as a sum, not considering its interlinking and emerging properties, a key feature in “holism”.

Undoubtedly is the fact that however used, the term is the most occurring and one of the defining attributes of ERM, that it proposes to be an all-encompassing method in dealing with risk.

The studied scientific literature mainly indicates the usage of the term “holistic” as for describing the ERM process as an overarching process picturing a broad picture of the risks that may affect an organization, see for example (Abkowitz & Camp, 2011; Agarwal & Virine, 2018; Bates et al., 2012; Gatzert & Martin, 2015; Gifuna & Karydasb, 2010, p. 55; Kasim, Aziz, & Kasim, 2012). Those examples that explicitly mentions the term usually gives more context of the term e.g. using a holistic perspective in identifying risks, implementing a control process for monitoring a company’s risk portfolio etc.

Explicit results:

In the article (Lee & Green, 2015), the systems thinking approach to risk management differs from what the authors refer to as a more analytical and reductionist approach. The analytical/reductionist process consists of breaking a system down into smaller parts. Each individual part is examined until its “understood” and then the total assembly or aggregation of the parts defines the understanding of system. Commonly referred to as “The great machine” (Lee & Green, 2015, p. 198). The ERM process, according to the authors is focused on aggregation and the sum of individual risks and is to be considered inadequate as a holistic way of addressing risk. The use of systems thinking to analyze and understand risks is the solution to this problem. The statement is not only normative but descriptive examples are provided as well. These include root cause analysis, cultural theory, risk homeostasis theory and risk compensation theory. The article points out the importance of truly achieving a holistic risk management requires recognizing the interdependencies among internal and external factors connected to an entity (Lee & Green, 2015, p. 198).

The use of holistic appears in the study by (Sax & Torp, 2015). The study emphasizes that to achieve a holistic risk management a combination of ERM must be made with participative leadership and by empowering employees so that they can identify and address threats and opportunities (Sax & Torp, 2015, p. 1454).

In the article (Gifuna & Karydasb, 2010), holistic is expressed explicit as a definition of ERM. The description of ERM as offering a holistic view of the entity to manage a variety of risks (Gifuna & Karydasb, 2010, p. 55). The same multi-risk holistic is in the article (Bates et al., 2012). It is mostly used as a description of the ERM-model, simply described as “holistic”. But a deeper description does follow as the authors elaborate that ERM is a holistic model in the sense that it should cover all possible risks that a company faces. Furthermore, ERM is supposed to work as a comprehensive and integrated framework for managing several types of risk e.g. credit, operation, economical capital. Hence, there is another side of risk as it also can be seen as a possibility to gain competitive advantage (Bates et al., 2012). The same reasoning is done by (M. D. Abkowitz & J. S. Camp, 2011; Gatzert & Martin, 2015; Kasim et al., 2012).

O'Donnell (2005) explicit mentions the term holistic as an important factor for a successful risk identification. O'Donnell present a framework for identifying possible events that could hinder a company's performance ability. By creating a value-chain map an organization can holistically identify different procedures and agents that drive each component in the process. Hence, certain events could be identified that could hinder business process performance (O'Donnell, 2005). Holistic is treated the same by Agarwal and Virine (2018) who uses the term "holistic" several times for describing ERM. Explicitly mentioned as a holistic view of risks can be achieved within the organization, if implementing ERM. More explicit, by categorize different risks and how they might affect business operations a more holistic view is gained e.g. internal risks, strategy risks, external risks (Agarwal & Virine, 2018).

Makarova also use the term holistic as a description of the ERM process. Makarova states, by applying "modern ERM" an organization can holistically manage its risk assessment and risk analysis, giving management the appropriate tools for evaluating risks for the organization to achieve its goals (Makarova, 2017, p. 132). Similar, Abkowitz and Camp (2017) mention the term holistic in an article from 2017. The term is mainly used to describe ERM as a holistic method. But also, the authors amplify the concept of ERM as an overarching structure to the risk management process. Furthermore, organizations should include all hazards that could affect their operations (Abkowitz & Camp, 2017, p. 80).

Mensah and Gottwald (2015) use the term holistic several times, mostly it is used as a description of ERM being a holistic risk management process. Explicitly, organization should have a wide approach in identifying, monitoring and reporting their risks (Mensah & Gottwald, 2015, p. 13). The same reasoning is carried out in the articles (Beasley, Branson, & Pagach, 2015; Bogodistov & Wohlgemuth, 2017a; De Souza et al., 2012; Hossein Nezhad Nedaei, Abdul Rasid, Sofian, Basiruddin, & Amanollah Nejad Kalkhouran, 2015; Lundqvist, 2014b; Eduardo. Rodriguez & John S. Edwards, 2015). The authors (Gatzert & Schmit, 2016) elaborates the same reasoning with the extension of including possible interdependencies between risks.

In the article (Ting, Kwok, & Tsang, 2009), the authors mention the term holistic as an important factor to manage "enterprise-wide risk". To achieve this an organization needs to break their barriers e.g. cultural, functional, or departmental. Only when this is done an organization can truly implement a holistic and integrated risk management (Ting, Kwok, & Tsang, 2009).

Implicit results:

An implicit notion of holistic can be found in the article (Burnaby & Hass, 2009). The statement is that every person in an organization needs to participate in identification and management of all key risks. The article promotes the monitoring of ERM to be run by the internal audit function within a company. Ownership of identified risks are put on individuals and departments within the organization (Burnaby & Hass, 2009, p. 542). Green implicitly mentions holistic as enterprise risk management is described as a method for managers to handling risks of the entire enterprise (Green, 2016, p. 3).

2.6.4 Background knowledge

The term "background knowledge" will be defined as expressed in (Aven & Ylönen, 2018). The definition could also be expressed as "the questioning of background knowledge". Background knowledge, according to beforementioned, consists of the underlying assumptions which build up analysis and conclusions (Aven & Ylönen, 2018, p. 16). What will be sought after in the literature is if these underlying assumptions are recognized, addressed, or provided to ensure transparency.

Frequency:

As Figure 10 shows, deeper discussions regarding "background knowledge" seldom occur in the studied literature. Clear explicit examples were scarce but those found showed a descriptive take on the term. Implicit results are more diffuse. As the literature show a discussion of "background knowledge" can be as simple as having an open discussion-climate where, for example, assumptions are questioned in a transparent way.

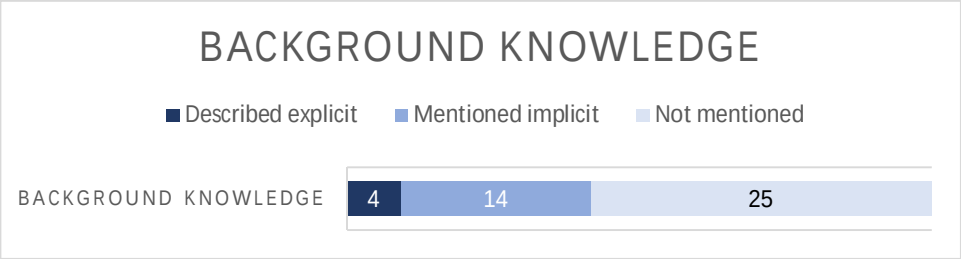

Figure 10 – The occurrence of "background knowledge" in the literature.

On par with "Black swan" in terms of lacking explicit coverage, its slightly more appearing in explicit terms. The implicit examples go through redefining priorities among stakeholders, revise initiatives and criteria for identified risk scenarios to more risk culture associated topics such as discussing opposing positions. Most interesting is the case of the Norwegian company Equinor, where formal and annual "justification of assumptions" is mandatory.

In general, the questioning of established assumptions and background knowledge is considered lacking in ERM context and something to contribute to better risk management in general. The few examples presented covers the topic well.

Explicit results:

A good explicit example of the questioning and reevaluation of assumptions and conceptions is presented in "Systems thinking and its implications in ERM" (Lee & Green, 2015). The authors describe the importance of feedback and learning in a system. This plays a crucial role in making a system adaptive, responsive and makes the system being able to understand emergent properties. The concept of double loop learning in ERM is presented in Figure 11. Both single and double loop learning are needed for the system to fully perform and to achieve the questioning of "Background knowledge".

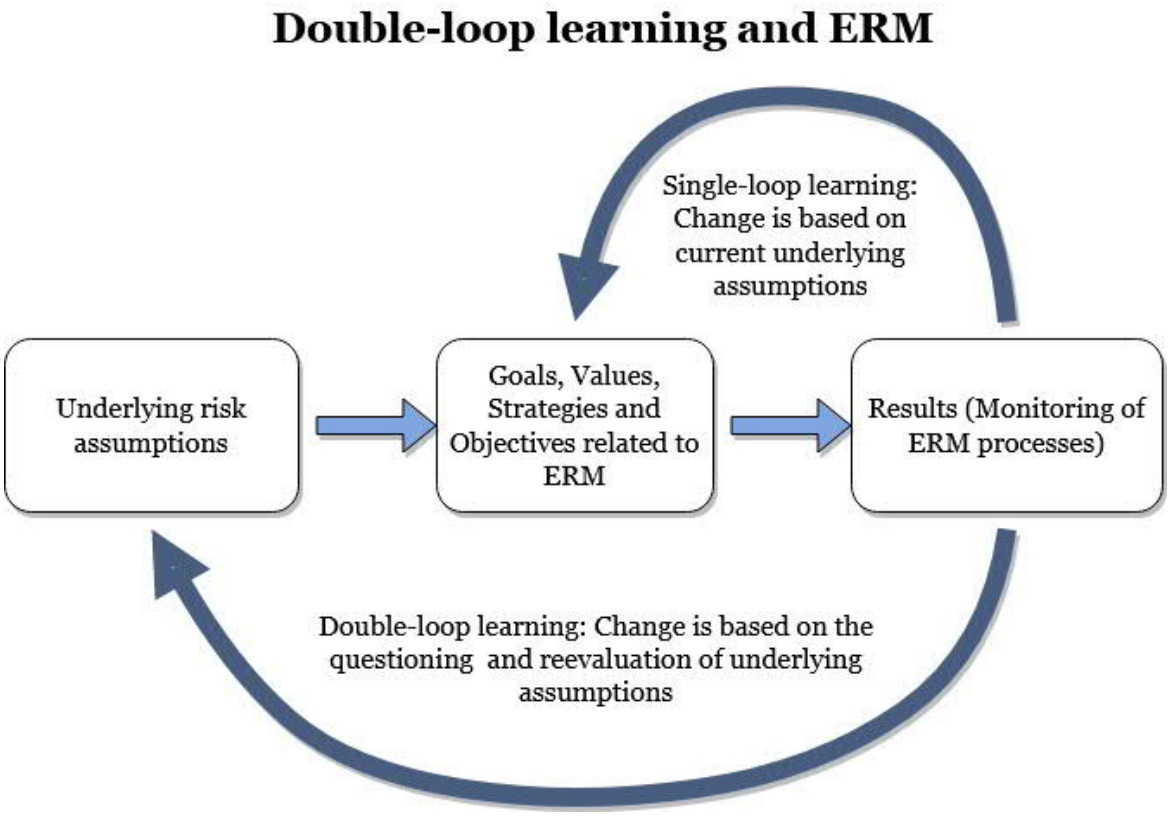

Figure 11 – Double loop learning in the ERM process. Source: Adapted picture from "Systems thinking and its implications in ERM" (Lee & Green, 2015).

Implicit results:

The article "Multi-perspective scenario-based preferences in enterprise risk analysis of public safety wireless broadband network" (Hassler et al., 2020), covers questioning of background knowledge through the iterative process of redefining priorities among stakeholders. The questioning of background knowledge is illustrated in the part of the framework that reframes and revises initiatives and criteria for identified risk scenarios. (Hassler et al., 2020, p. 5). The process is iterative and provides guidance how to incorporate new information that becomes available. It does not, however, provide means or a method of questioning the source of new information or how to critically address pre-existing assumptions or background knowledge.

Another implicit description of the questioning of background knowledge is found within "A theory of enterprise risk management". It occurs in the context of how risks are being reported to a higher instance in the company. The example of how the Norwegian energy company Equinor needs to annually deliver detailed risk information including discussions and justifications of assumptions (Jankensgård, 2019, p. 574). Similar is implied in (Sax & Torp, 2015), a theoretical foundation of the study states that to develop a leadership style that promotes challenging of existing processes and customs there is a need to create "a culture of psychological safety in which speaking up is considered safe". More specific, the authors refer to this as a culture that promotes discussions of opposing positions and making sure employees opinions are valued (Sax & Torp, 2015, p. 1456).

2.6.5 Limitations

"All models are wrong, but some are useful" -George box. The definition of limitations in the studied literature will be as following: If a provided model or framework regarding ERM or risk management recognize the limitations and shortcomings of its own application. As an example, if a presented ERM framework or model is described as great for capturing a certain risk X, does it also frame what risks might Y go unnoticed or if the process is only applicable in a certain context C.

Frequency:

From the definition above. Explicit and implicit examples of the definition are highlighted and presented below. Figure 12 present the occurrence of explicit and implicit results.

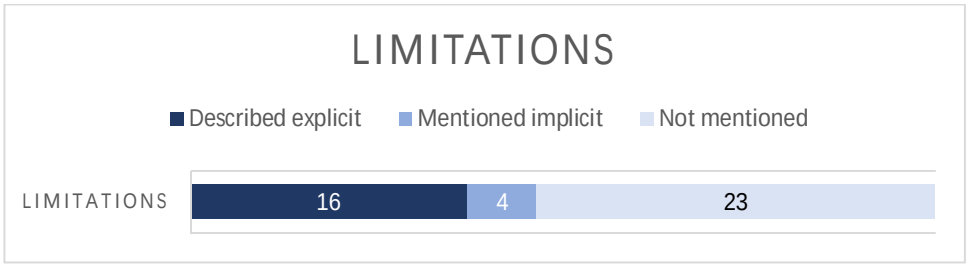

Figure 12 - Occurrence of explicit and implicit mentions of limitations.

Limitations is covered in 16 articles explicit, four times implicit and not mentioned in 23 of the articles. The subject or topic can be considered present in half of the articles. One of the most interesting examples from the studied literature is extracted from (Gifuna & Karydasb, 2010) regarding Business Continuity Planning: knowing the capabilities, limitations and vulnerabilities of a system and its personnel.

Compared to the initial definition of the aspect "limitations", a clear framework or method resulting in a systematic approach to dealing, addressing, or identifying shortcomings and limitations have not been found within the studied articles. The closest thing is the explicit example first described.

Explicit results:

In the article by (Gifuna & Karydasb, 2010) the term “limitations” is expressed explicitly. The result is found in the definition of Business continuity planning (BCP). A key attribute of BCP being the ability to know the capabilities, limitations and vulnerabilities of a system and its personnel (Gifuna & Karydasb, 2010, p. 57). The article by (Hassler et al., 2020) explicitly covers the limitations surrounding their own presented model. Also, how expert opinions gathered in the model are prone to bias put into subjective values rather than the values of the system/enterprise as a whole. (Hassler et al., 2020, p. 15). Similar is the reasoning by (Bates et al., 2012) who specifically point out one general limitation to risk management. As there is a sense of subjectivity imbedded in the categorization of risks i.e. the likelihood and consequence given a certain risk. Since these values could differ depending on who made the risk assessment. Bates et al. (2012). states this could be avoided by having an appropriate training in risk management, or by making the team involved in the risk management process more uniform in their assessments by implement and work from a standardized framework. Hence, consensus would be reached within the company (Bates et al., 2012), the same reasoning is carried out by (Green, 2016).

The remaining examples covers a range of subjects where the majority is the limitations of ERM as a concept itself. A few points out the limitations due to subjective bias, either in form of risk assessments, assigning likelihood to a risk or the subjective transformation of information as it passes through various instances in an entity. Another described limitation of ERM as a concept, or rather a shortcoming, is the impossible task of systemizing an infinite number of risks.

In the article (Kasim, Hanafi, Aziz, & Kasim, 2012) the authors mention the limitations bound to ERM. The authors summarize four issues that mainly affect why companies fail to implement ERM e.g. A too complex risk language, the human factor, complex framework, a silo-based risk management. Furthermore, the authors identify one key barrier for ERM implementation, that is the culture within the organization and how prone it is at adapting a new risk management method. Limitations of ERM as a concept is also pointed out by Tekathen and Dechow (2013). The ERM process is to create a bottom-up driven risk management process. The longer the process the more likely it is at creating a mutation of information. If a process was hands on at the first point of origin it loses its purpose at its point of destination. Moreover, ERM does not help, according to the authors to reduce uncertainty (Tekathen & Dechow, 2013, p. 113). Abkowitz and Camp (2017) deliver some critique to the ERM, more precise on the matter how company's asses their risks. As companies segment their risks by department, division, project, and if they affect the individual or the enterprise. The authors conclude that this does not yield a complete set of risks (Abkowitz & Camp, 2017, p. 81). Other authors, for example Ashby et al. (2018) explicitly mentions a limitation of the concept of ERM as it does not touch upon the matter of when uncertainty turns into a risk. Furthermore, the authors criticize ERM for not specifying which departments are in specific need of a risk manager (Ashby et al., 2018, p. 187).

Beasley et al. (2015) states existing research focuses mainly on the impact a Chief Risk Officer, CRO, would have on an entity's ability to apply ERM. Moreover, the authors see the fact that no other processes are investigated further, this due to the lack of availability of information. Hence, other processes of top management might be overlooked. Furthermore, Beasley et al. (2015) shed light on the limitations of ERM that it can be perceived by some organizations only as a compliance tool with no or little strategic value. Bogodistov and Wohlgemuth (2017) also brings up several limitations surrounding the concept of ERM. Such as, the enormous efforts needed for creating a holistic risk management through all company levels, the problem of trying to systemize an infinite number of risks. According to the authors, this might create a "snowballing-effect" as follow-up decisions are required in handling the risks. Hence, creating major expenses for the company.

Bogodistov and Wohlgemuth (2017) state that their presented framework (dynamic capabilities), shown in Figure 4, is not the panacea since its restricted to certain "blind spots". The authors elaborate that risk management cannot adapt to everything. It can only develop different levels of risk resilience (Bogodistov & Wohlgemuth, 2017, p. 247).

2.6.6 Protective values

The definition that will be used is the definition of “valuable assets” presented by (Cedergren & Hassel, 2018) in the draft as well as course literature “a risk assessment framework for land use planning”. Risk poses a threat to something held in value. Different perspectives of stakeholders might have different views regarding what is held valuable. (Cedergren & Hassel, 2018, p. 14). Sought after in the studied literature is if there is a process that helps a company identify, define and/or prioritize what is valuable and necessary to protect, hence protective values.

Frequency:

As described in Figure 13, in the covered 43 articles, the term is described explicit and implicit 16 times each and not mentioned at all in eleven articles.

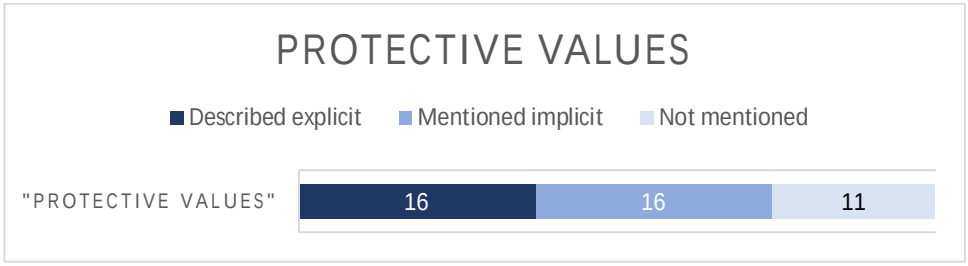

Figure 13 – Occurrence of the term or concept “protective values”.

The explicit results in the literature are sometimes specified, as the importance to protect operational, informational, and physical dimensions of an entity. Sometimes protective values are described as what can be lost or what is exposed. In some articles, it is commonly referred to as company goals and objectives. Implicit examples are processes of defining business functions, operations, and annual objectives.

The thesis was chosen to be written in English rather than Swedish to not lose words in translation. Translating the word safety in English to Swedish “Säkerhet” being a prime example of this, meaning gets lost in translation. In terms of “protective values”, it might be the other way around. In hindsight, translating the Swedish term “skyddsvärden” to “valuable assets” would probably have been a better choice of words rather than “protective values”. This would probably alter the explicit results. The implicit ought to be not affected in the same breath since those results are more based on the definition of the aspect itself.

Explicit results:

The article (Leech, 2018) explicitly not only states the importance of identification of protective values but also the lack of thereof in the COSO framework of ERM (Leech, 2018, p. 3). One of the main arguments in the paper is that ERM frameworks are "risk-centric" when in fact they should be "objective-centric". By being risk-centric, a company starts their risk management processes by stemming work from a perceived risk and then specify how this specific risk affects whatever is held in value to the firm. The opposite, a better approach according to the author, is by being "objective-centric". This framing makes risk management revolve/progress from first specifying what is value-creating and what objectives to preserve and afterwards, start listing whatever risks poses a threat to beforementioned (Leech, 2018, p. 2).

The authors (Schiller & Prpich, 2014) also suggest in their article that the ERM concept is unspecific about actual integration and management of risks. The approach of strategic risk planning, the risk management process is first initiated by defining goals and then identifying risk management processes of a specific risk. Protective value in this case being the defined goal (Schiller & Prpich, 2014, p. 1003). Protective values in the article also appears in the critique against the ERM framework, the problem being that risks are incommensurable between stakeholders. The critique regarding commensurability and comparability is pointed towards the ERM concept of risk portfolio management, risk transfer and risk appetite (Schiller & Prpich, 2014, p. 1004). The same definition is used by the authors Agarwal and Virine (2018) where protective values are explicitly described as the company objectives. After describing the objectives, the risk management process then moves onto setting and the event identification. Bottom line: By assessing risk and what impact it may have on an organization, the objectives must first be in place and align with the organization's goals and its risk appetite. Furthermore, the authors state a distinguishment must be made in the event identification phase between risks and opportunities (Agarwal & Virine, 2018, p. 298).

A rather normative view is presented by Gatzert and Schmit (2016) as they advocate that an organization should identify risks in terms of what can be lost, the cause and what makes the loss more or less likely. Bogodistov and Wohlgemuth (2017) similarly mentions "protective values", it is described as crucial for management how to identify which events that have the greatest impact on the company. By applying a resource-based perspective it become more clear what risks the organization should focus on (Bogodistov & Wohlgemuth, 2017, p. 235).

While being a reoccurring topic, not considered missing, it can be discussed how important this is regarding the risk management process of ERM. The COSO ERM framework (COSO, 2004) has the component "objective settings". Stated in this component is the need to set objectives before management can start to identify events affecting these. There is no specific order to carry out the eight components of the framework arguably there is no need for that, in fact we share the statement that the COSO process, and any risk assessment process, should be iterative or multidirectional. The question, however, can be asked as to what defines what. Call it a "chicken and egg" situation, does valuable assets, objectives and goals define what is considered a risk or vice versa, should risk define what is held valuable? There is a discrepancy in the covered articles and there is no clear consensus as what should be done in which order. Referring to the critique formulated by Leech, the point is made that ERM is currently being risk- rather than objective centric. To properly address relevant risk facing an entity, as well as an attempt to commensurate the "subjectiveness" of a consequence between stakeholders, there needs to be some form of unity in what is considered valuable to the entity as a whole and not just individual parts or stakeholders.

An explicit set of protective values is presented by Abkowitz and Camp (2017). The authors describe three dimensions of defining risks: operational, information and physical. From these categories the company can constitute the overall risk. Operational constitutes of financial decisions, resource management and employer branding and customer relations. Information system risks include computer hardware and software and the information that is bound within these systems e.g. personal records, bank accounts, customer accounts etc. The physical aspect constitutes of the organizations physical assets including buildings, stocks, employer health and safety. All of the above-mentioned dimensions have different risks associated to them and the recommendation by the authors is to handle them by scenario-analysis for each potential hazard (Abkowitz & Camp, 2011). Eduardo. Rodriguez and John S. Edwards (2015) describe "protective values" as a part of risk identification. More specifically, as a process of identifying possible effects that may affect the organizations business operations (Rodriguez & Edwards, 2015, p. 45). Hence, business operations being the protective value.

Implicit results:

In the article by (Althobaiti & Aloraini, 2019), the term protective values appear implicitly in the form of identification of "business functions such as services, products or processes including IT systems and gathers information to prioritize critical business functions" (Althobaiti & Aloraini, 2019, p. 263). The identification of these is done by conducting a so called "Business Impact Analysis and Risk Assessment". In (Bates et al., 2012) the term protective values appear implicitly as a part of the risk identification. The authors list several different risks that may affect the entity's operations. The operations being what is held valuable.

Similarly, in the article (Arena et al., 2010), protective values appear implicit in the implementation of ERM at an Italian telecommunication company. The formal risk management starts when the annual objectives are defined. From these objectives managers are supposed to identify risks that may oppose these objectives (Arena et al., 2010, p. 665). This might even propose a systematic reevaluation of risks in terms of changed objectives. This was however pointed out in the article as something that only happened formally and not in practice. Formal meetings and workshops were only held during the implementation year and afterwards it was conducted through questionnaires (Arena et al., 2010, p. 665).

2.6.7 Resilience

The definition of the term resilience will be the one stated by Becker (2014), as a system that can anticipate, recognize, adapt and learn from a disruption or disturbance towards the system or entity (Becker, 2014, p. 154).

Frequency:

The occurrence of the term, seen in Figure 14, shows that resilience is described explicit in eight articles, implicit in eleven and not mentioned at all in 24.

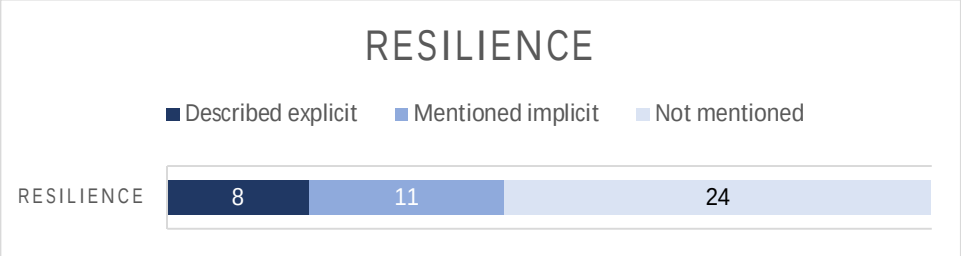

Figure 14 – Resilience, in the studied literature.

The results are few, some describing examples of a resilient entity, most of the explicit results are however sheer use of the word resilience or resilient. The implicit results are interpretations of various adaptions and reactions to disturbances as well as focus on monitoring activities.

Explicit results:

In the scientific articles several authors, for example Amin (2019) refers to resilience as stated in the introduction: "...the ability to prepare and plan for, absorb, recover from, and more successfully adapt to adverse events". A proposed model, a road map, introduced in the article is claimed to help a company develop resilience (Amin, 2019). Another example is presented by Bogodistov and Wohlgemuth (2017) as the authors explicitly mentions the term "resilience" as a capability to respond to unanticipated events. According to the authors an organization should be able to "respond environmental uncertainty through resource reconfiguration" (Bogodistov & Wohlgemuth, 2017, p. 241).

Other authors, for example (Abkowitz & Camp, 2017; R. Agarwal & Virine, 2018; Ashby et al., 2018) use the term without any further description. Abkowitz and Camp (2017) use the term resilient as they suggest their risk assessment protocol would enhance enterprises ability to become less vulnerable and more resilient (Abkowitz & Camp, 2017, p. 89). Ashby et al. (2018) mentions the term as a way that organizations can handle uncertainty and thereby increase their resilience in facing the unexpected (Ashby et al., 2018, p. 186).

Implicit results:

In the article (Jankensgård, 2019), in addition to a identifying and monitoring risk assessment process, the author proposes the concept of "economic capital" to absorb disturbances. The concept is simply put to ensure the amount of capital needed to stay solvent in a worst-case scenario is available (Jankensgård, 2019, p. 571). While lacking the "learning" aspect from the definition of resilience, it is still considered an implicit implication of building a resilient entity capable of handling disruptions.

Normatively, resilience appears implicit in the article (Kurdi et al., 2019). Resilience is being implied in the authors definition of good practice of risk management. The statement is that risk management needs to be defined, dynamic as well as effective in reporting, monitoring and the ability to adapt to changes by management (Kurdi et al., 2019, p. 83). Similar, resilience is being implied by Lee and Green (2015) in their description of the event identification phase of enterprise risk management. The entity needs to be able to monitor changes in the environment, understand the relationship between individual parts as well as the effects of change in the environment (Lee & Green, 2015, p. 198). The monitoring and adaptation to the surroundings of an entity is considered an implication of resilience.

The above mentioned examples are captured in the scoping study as implicit examples of resilience since the attributes are matching the definition adapted from Becker (2014), as a systems ability to: anticipate, recognize, adapt and learn from a disturbance. What is not captured here is if the authors (Kurdi et al., 2019) themselves would label their risk management process as resilient or even share the same definition of the term. The representations of the implicit results are not drawn from a single sentence or section of text but rather a conclusion of the studied article as a whole since the term resilience is a composition of four key aspects.

2.6.8 Robustness

The term robustness will be defined as by the authors (Wieland & Wallenburg, 2012); as the ability of a system to resist change without adapting its initial configuration (Wieland & Wallenburg, 2012, p. 890).

Frequency:

As shown in Figure 15, robustness appears explicit eight times, twelve times implicit and not mentioned at all in 23 of the 43 covered articles in the study.

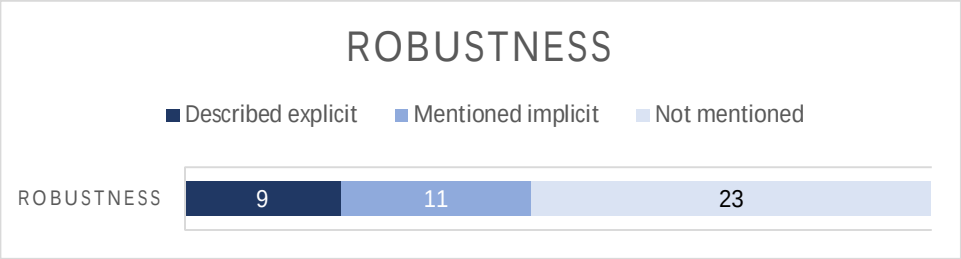

Figure 15 – The frequency of the term robustness in the literature.

The results show that the word is mostly used as an adjective or as something ERM evolves into. The results are lacking in terms of findings regarding how organizations would practically implement a "robust" ERM-process. Below follow examples how the scientific literature treated the term.

Explicit results:

Nielsen and Pontoppidan (2019) mentions the term simply in the context as "Robust ERM program should help employees manage risk in a better way…" (Nielsen & Pontoppidan, 2019, p. 7). How this robust ERM program is to be accomplished is not described further. The simple use of the term is also found in an article by Gatzert and Schmit (2016) but now in the context of industries would benefit from having a planned and robust communication plan in order to limit reputational loss (Gatzert & Schmit, 2016, p. 36). Thus, the term is not broadly used within the scientific literature. Most often the term is used without any further elaboration.

Other authors, for example Beasley et al. (2015) refers to robustness as a part of "ERM maturity" i.e. how well integrated the ERM-process is within the company's system. Furthermore, the term is explicitly used several times in the article in terms of a more robust risk oversight (Beasley et al., 2015). Agarwal and Virine (2018) use the term as something not to expect immediately when implementing ERM practices in a short time span. To achieve a robust ERM system in the organization it is crucial to align the ERM practice with organizational processes (Agarwal & Virine, 2018, pp. 307,312).

Implicit results:

Bogodistov and Wohlgemuth (2017) implicitly mentions the term “robustness” in terms of a company should have dynamic capabilities processes to effectively respond and recover from risky events that might occur (Bogodistov & Wohlgemuth, 2017, p. 236). The recovering aspect mainly being the aspect of robustness.

2.6.9 Communication

The term Communication will primary be concerning communication about risks facing various actors and how this is communicated through a system or between stakeholders. As stated by Kramer (2005), success is tied to the ability to draw conclusions, putting together the “big picture” and to “connect the dots”. The problem, in large entities is information might end up being isolated inside groups/departments with diverse priorities, objectives and tasks (Kramer, 2005, p. 401). The context sought after inside the studied literature is how a framework or model promotes communication regarding risks in between stakeholders, department, or similar compositions of people within an entity.

Frequency:

The occurrence of the term “communication” from the studied scientific literature is presented in Figure 16 below. Of 43 studied articles, the term was explicitly described in 27 articles, implicitly mentioned in eight articles, and not mentioned in eight of the studied articles.

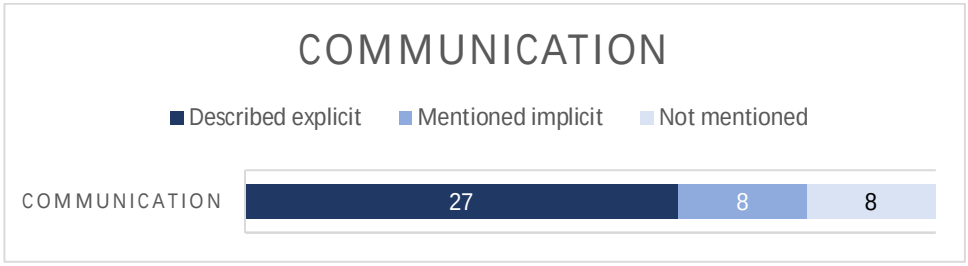

Figure 16 - Occurrence of the term "communication" in the scientific literature.

The possible interpretation of the term “communication” from a risk perspective is broad. As the results below shows.

Explicit results:

A common factor amongst practitioners and researchers within the field of ERM is that of having a sound risk culture in order to gain a functional risk communication process (Agarwal & Virine, 2018; Green, 2016; Sax & Torp, 2015; Schiller & Prpich, 2014). The literature shows uniform results regarding communication as important in how to create a sound risk culture, i.e. making the company view of risks coherent. Moreover, it is important because organizations usually manage known risks which prevents them from spotting unknown ones. Moreover, a successful ERM requires interdisciplinary collaboration between different levels within the organization (Stoll, 2015, p. 11). Communication plays an important part for gaining an interdisciplinary implementation of ERM. This view is also recognized by Mensah and Gottwald (2015). By increasing communication and collaboration surrounding the risk management process. A broader and more understanding perception of risk is reached within an organization. Furthermore, it assures an ownership of risks that stretches from operating managers to employees (Mensah & Gottwald, 2015, p. 5).

Other results imply that a well-functioning communication process can reduce uncertainties (Ashby et al., 2018; Bogodistov & Wohlgemuth, 2017; Schiller & Prpich, 2014, p. 108). It plays an important role as an integrating tool for ERM success (Rodriguez & Edwards, 2015). Explicitly, communication make a difference and calls for the recognition of both clear and tacit knowledge. Tacit knowledge, introduced to new personnel through social interaction, is difficult to formalize. ERM processes, according to the authors, is more defined in terms of explicit knowledge which can be transferred formally through documentation. Knowledge in both forms, tacit and explicit (written) knowledge is a foundation of successful communication of risks, uncertainties and ambivalences (Schiller & Prpich, 2014, p. 108). Which can be linked to the results in section 2.5.5-Hybrid models for enhancing ERM.

Some authors, for example Kurdi et al. (2019) and Leech (2018) stress upon a top-down communication process. Leech (2018) state the best way to communicate risks is by having a formal reporting chain. So top management can assess whether risks are within the risk appetite or tolerance of the company (Leech, 2018, p. 3). Kurdi et al. (2019), describes the communication of risk founded in policies, procedures, and the reporting structure of a company. These are in turn connected to the board and management commitment, capacity and accountability according to the authors (Kurdi et al., 2019, p. 84).

In contrary to the top-down view Sax and Torp (2015) addresses communication from a bottom-up perspective. Employees are described as an important source to organizational learning, change and reporting. The bottom-up driven risk communication process can be hampered by employees or subordinates not sharing information or perceptions of risk out of fear of demotion or humiliation. The way to address this issue according to the article, is by implementing an anonymous whistle-blowing system (Sax & Torp, 2015, p. 1455).

Another example regarding risk communication is given by Agarwal and Virine (2018). Who describes the importance of risk communication in project-based organizations. Explicitly mentioned, having a developed communication process about risks it could in length support a sound risk-based decision making. According to the authors, communication with external stakeholders is managed by the Chief Risk Officer. Furthermore, the authors present a communication model for handling communication and securing a sound risk-based decision making. The authors stress upon the crucial part of having a good risk culture starts with a clear stated tone from top management (Agarwal & Virine, 2018, pp. 306-307). Which could be in line with the top-down perspective on risk communication.

Communication is set in relation to uncertainty as presented by Ashby et al. (2018) and Bogodistov and Wohlgemuth (2017). According to (Ashby et al., 2018) several experts should be included to execute appropriate risk management procedures. Hence, ERM is a human based resource process and the effectiveness of that process depends at large on the persons who organize and carry out the task (Ashby et al., 2018, p. 198). Bogodistov and Wohlgemuth (2017) elaborates further on the matter as a better communication process would in the authors opinion increase the company's ability to withstand unlikely events and furthermore attain a higher efficiency in its ERM process (Bogodistov & Wohlgemuth, 2017, p. 242).

Burnaby and Hass (2009), covers the term communication explicit as a mean to successful risk management. It is displayed in an example of a supply shortage within a certain function of a company. The shortage, which reaches a critical level is not a surprise to the purchasing agent, who is familiar with the limitations of supply. It does however come as a surprise to the company. The explicit communication is stated as: if the purchasing agent understood ERM, the risk would have been communicated and included in the company risk portfolio. If the risk is included in contingency plans, it would have addressed in the event of shortage, and critical levels in supply would have been monitored effectively (Burnaby & Hass, 2009, p. 542).

Gatzert and Schmit (2016) state that communication is vital for handling reputational damage. Both internal and external communication play a key role in mitigate the reputational damage (Gatzert & Schmit, 2016, p. 38). The term communication is also implicitly mentioned by Gatzert and Martin (2015). The term is not discussed on a deeper level. But the authors states ERM implementation would give a company better means to communicating its risk profile that would benefit its decision-making and could also bring value in term of important shareholders can get a better picture of the financial and risk position of the company (Gatzert & Martin, 2015).

Implicit results:

Hassler et al. (2020) present a framework that collects and shares the risks among all concerned stakeholders. The framework serves to identify current and future emerging risks facing the stakeholders of an enterprise and how to grade and prioritize assessed risks. (Hassler et al., 2020, p. 197). Even though the model itself serves to rank and prioritize the collective perspectives form involved stakeholders it does not provide, at least not explicit, systematic means of how to communicate risk between the stakeholders themselves.

Althobaiti and Aloraini (2019) mentions the main form of communication of risks is illustrated in post-exercise reports that is shared with stakeholders and management. The purpose of this communication process is to assign ownership of identified risks to the affected unit/party (Althobaiti & Aloraini, 2019, p. 264).

Communication is a broad term and involves several different processes. As mentioned above the term is explicitly mentioned in 27 of the studied articles. There is no full consensus reached within the studied literature regarding communication models for ERM implementation. It rather shows ambiguity regarding the many different interpretations of the term. This can possibly be explained by different companies communicates risks through different models. An important result is thus having a solid communication process for integrating ERM within all layers of the company. And also, the function it serves as a way for organizational learning. Making the process both bottom-up and top-down would benefit organizations e.g. learning from and better identifying risks.

2.7 Summary of the results

In the following section, a brief summary of the results will be presented in Table 1. Highlighting some of the important findings from the scoping study.

Table 1 – Important findings in the ERM literature regarding general aspects of ERM and "the new risk perspective".

Topic or aspect:	Finding:
Consensus around ERM	ERM being a holistic, top-down driven, systematic way of aligning strategic objectives with organizational culture.
Risk Culture in ERM	Ensure risk awareness, responsibility and accountability. Take "risks" in an informed manner. Provide a coherent view on risks.
Vague framework	Implementation frameworks leaves the more detailed processes to be invented by the implementer.
"Hybrid models"	To make ERM more sensitive to industrial context, an appropriate hybrid model might be added such as Business Continuity Planning or knowledge management.
Illusion of control and over-focus on ex-ante risk management	Formalized guidelines might embed practitioners in the "illusion of control". ERM should not only focus on identified and listed events but also include capabilities of responding actions.
Commensuration problem	All risks cannot be measured in monetary terms. Is there a discrepancy between shareholders regarding what is held valuable?
Relying on incomplete knowledge	Connected to knowledge management, ERM is relying on incomplete historical knowledge, managing what is known and leaving out what is unknown.
Uncertainty	Various meanings, no clear consensus.
Black Swan	Missing aspect, important to frame and put into decision making. Can be identified with expert screening.
Holistic	Reoccurring aspect, various interpretations.
Background knowledge	Missing aspect, double loop learning can enhance the ability to question underlying assumptions.
Limitations	No general conclusions found. One finding stress the need for recognizing limitations, capabilities and vulnerabilities.
Protective values	Important to frame what is value-creating, define company goals and objectives. Important in terms of aligning risk management practices. Can be connected to before-mentioned risk culture.
Resilience	Missing aspect, important to enhance the ability to absorb and recover from harmful events.
Robustness	No clear conclusion.
Communication	Broad term, important in shaping of organizational learning, collaboration between levels of the entity, ensure ownership of risks and reducing uncertainty.

2.8 Discussion

First follow a general discussion of the results from the scoping study. Secondly a discussion is presented regarding method, limitations and potential bias affecting the study. And at last the conclusions from the scoping study is presented by answering the research question.

2.8.1 General discussion

A central aspect of ERM is the holistic overview it could bring to an entity. As presented in section 2.5.1-Definitions of ERM and in section 2.6.3-Holistic being the most cited term within the scientific literature. ERM can be said to be holistic in two ways. 1. ERM is framed to be an all-encompassing concept in dealing with all risks and 2. ERM is holistic since it includes every department of a company. The definition regarding holistic as the creation of an all-encompassing framework, which includes all parts of an entity is the probably the most preferred one. Since the other referred aspect of holism, the one that aims to manage "all-risks", is considered as normative and impossible to achieve in practice. The normative aspect in this being that the framework itself seeks to provide answers and solutions to every identified risk and this resulting in before-mentioned "illusion of control". As pointed out in section 2.6.1-Uncertainties, it is impossible to identify and address every single risk due to the unpredictability of the environment. This could also be further empathized by the lack of "black swan" results in the literature. How can a risk management process or framework be holistic in terms of dealing with every risk, when there clearly is a lacking aspect in addressing the uncertainty regarding events individuals cannot imagine, predict or quantify?

Communication and learning regarding risks are also a result that stands out. For example, how knowledge is transported between the blunt and sharp end of a company and how knowledge or "justified" beliefs being a central aspect of the new risk perspective. Gaining knowledge, managing it, and integrating it within an organizational process making it available for essential parts of an organization is considered to be an essential part of successful ERM. A proposed model for enhancing single- and double loop learning is presented in section 2.6.4-Background knowledge. The value of single- and double loop learning is considered to be an important factor for organizational learning as well as the acknowledgement of "tacit learning". Successful knowledge management could possibly limit the chance of making the same mistakes again, draining economic and organizational capabilities on risks that could already been avoided or dealt with by the knowledge imbedded within the organization.

Another important result, a rather obvious one, is the responsibility of top management in implementing the right culture and formulate strategic objectives in which risks can be identified. A clear, stated objective would hinder the possibility of making the risk culture or the risk appetite arbitrary, better justifying ERM. Thus, clarifying the purpose of the process making it work within all levels of the company, and possibly making the risk management process more inclusive for employees. Which as an example is mentioned by Sax and Torp (2015) as the authors refers to this as a culture that promotes discussions of opposing positions and making sure employee's opinions are valued (Sax & Torp, 2015, p. 1456).

But similarities can also be found in Agarwal and Virine (2018) and Stoll (2015) as the authors explicitly mentions the importance to infuse a risk-based mindset for enhancing employer's ability to take on risks in an informed manner. There are incentives that risk culture might affect the decision-making of employees. This is also supported by Gatzert and Schmit (2016) as risks should be considered on an informed basis. Making the entire organization deal with operations through a coherent view on risks (Gatzert & Schmit, 2016).

How to implement ERM in practice is arbitrary, as mentioned and discussed in section 2.5.6-Critique and flaws of ERM. Complementary models suited for the field of application is preferable as mentioned in 2.5.5-Hybrid models for enhancing ERM, but also interesting results can be found within the new risk perspective. For example, a framework for creating a "highly reliable complex system" is presented by the authors Gifuna and Karydasb (2010). The framework draws synergies from different fields, one of them being business continuity planning (BCP). A key feature of BCP, which mentioned in 2.6.5-Limitations, is the ability to "know the capabilities, limitations and vulnerabilities of a system and its personnel". A lacking factor of ERM, with its corporate setting, is dealing with major disruptions and events. A way to address the issue is to borrow selected parts from BCP to complement ERM in ensuring "the continuity of core processes by building organizational resilience" (Gifuna & Karydasb, 2010, p. 57). The aim of BCP is to create an organization that quickly can "get back on track" in case a major event such as a disaster or system disturbance occurs. This framing differs from the other normative ERM descriptions or frameworks that seeks to "deal" with all risks through pro-active methods such as mitigation, avoidance, transfer etc. The BCP approach is more acknowledging to the fact that disturbances and consequences in fact do happen and enhances the responding and reacting capabilities of an entity. This goes in line with reasoning of Bogodistov and Wohlgemuth (2017a) and their stressing of the need for ERM to move beyond pro-active, monitoring aspects, to measures that also exist in the post-ante, responding and recovering, domains of risk.

Another shared view in the studied literature, as previously discussed in section 2.5.1-Definitions of ERM is the ambiguity surrounding the implementation of the concept. A full array of detailed processes or practical implementations are left to the practitioner to decide or invent. This leads to, which is also pointed out by Lundqvist (2014b), inconsistencies in terms of implementation and further enhances the ambiguity regarding ERM. This, however, leads us back to the critique delivered in (Nielsen & Pontoppidan, 2019). Namely, the industrial or sectoral context will shape the accounting and organizational practices, and that ERM is not to be considered "a one size fits all" solution. The blind spot in implementational practices left to be filled by sectorial context could be what makes ERM plausible in terms of adaptiveness. Organizational and operational practices between e.g. the fishing industry and banking will differ. For ERM to still be applicable in such different sectors, it needs to be revolving and focused on the "common denominators" to be of any substance.

The point being, detailed description of how to deal with "sharp end risks" in ERM might be unnecessary since it is not needed for a successful risk management aligned with strategical objectives. The key point being that strategical objectives help inform and shape whatever management process the implementer chooses in accordance with their own organizational context.

2.8.2 Limitations

Below limitations and potential bias of the study are discussed.

Scoping study limitations:

There are limitations to the scoping study that should be highlighted. First off, the methodology might seem straightforward and not too problematic. This is of course normative and as soon as undertaken, the task itself turns into a challenge. The first ambiguity is probably taking place when formulating the research question. “What defines ERM” or “how many times is the term resilience being used”, which one of these questions is the easiest to quantify and how does one categorize the results from the other? Delving into the articles it is easy to lose focus and start extracting whatever seems interesting, clearly putting a subjective touch on the qualitative results.

Another factor that might have influenced the results is the search string of the scoping study: *(“ENTERPRISE RISK MANAGEMENT” OR “ERM”) AND (RESILIEN* OR ROBUST OR HOLISTIC OR BELIEFS OR ASSUMPTION* OR SYSTEMIC OR ARGUMENT OR PERFORMANCE OR UNCERTAIN* OR PROTECT OR VALUES* OR LIMITATION* OR ASSUMPTION* OR “BACKGROUND KNOWLEDGE” OR “DECISION* MAKING”).* It is not impossible to rule out that the search itself only yielded the results we were looking for, call it “finding the hay in the haystack”. As means of comparison, it would be interesting to see what results in terms of frequencies of the aspects a search for just ERM would yield. This would serve to validate whether the search string itself “biased” the result.

Due to practical reasons and time limit, the covered articles were split up between the two of assessors in terms of reading and interpreting the results. Subjective bias cannot be excluded since it is impossible to be 100% coherent in our interpretation of articles, underlying meanings, and sheer definition of words. This might have resulted in over or underrepresentation of quantified data and what qualitative aspects or examples were deemed the most important results regarding the study. It does not have to be a negative aspect; it could turn out the other way as well. With different views, separating the workload enables more articles to be covered and a “bigger picture” to be seen, not just from sheer numbers but also from a wider array of angles viewing a topic.

With that said, the similar educational background and experience between us might also have influenced the results. Someone else conducting this study might reach different results and conclusions based on their “lens” tied to academic background.

Confirmation bias:

"What you look for is what you find", this is something that probably heavily influenced the results. A good example of this is in interpreting the number of implicit results of a certain term. Take for instance resilience; consisting of four parts: anticipating, recognizing, adapting, and learning. Reading an entire article presenting a risk management process which includes these topics it would implicitly be referring to a resilient process. And thus, an implicit result is quantified, based on a criterion set by the reader. Resilience can also be described as transition between different equilibriums. Another set of parts can then be quantified, the number of articles including "change" and "equilibrium". This will probably yield a different number of implicit results. What it comes down to is deciphering a general picture of whether a process or an article covering these aspects really can be described as "resilient" or "questioning background knowledge". This thesis has been set out to be as objective in gathering and quantifying information as possible, but it cannot be excluded that quantified and qualitative results are a product of confirmation bias.

2.9 Conclusions

The main objective of the first part of the thesis was to answer the research question:

> *What is known within scientific literature regarding ERM and what part of the new risk perspective is already present or represented?*

And to determine if and how the practice of ERM can be improved using insights from recent developments in risk management research.

Broad concept yet no clear definition

It can be concluded that ERM is a concept broadly described within the scientific literature and its application extends over multiple sectors. There exists no coherent view among the studied scholars regarding the practical implementation of ERM and this is something left to the practitioners to do. Several options are made possible for any organization wanting to implement an ERM framework, either adopting an existing framework or develop their own. The assessors have raised examples regarding possible key tools, techniques, frameworks, and complementary disciplines associated with risk management in a context of ERM.

Quantification of terms in the literature

The scoping study revealed that the most reoccurring topics of the new risk perspective were holistic, communication, uncertainties, and protective values. The least occurring aspects were black swan, background knowledge and resilience.

Ambiguous terms and concepts

There was a fair amount of ambiguity surrounding most topics. ERM, being described as holistic was either holistic in the sense of covering all risks or covering an entire entity, holism was the most reoccurring aspect. Communication also proved to be a reoccurring topic with wide different definitions. Uncertainties, fairly occurring, was so incoherently used that no real conclusions could be made, the same goes with the term robustness which was mostly used as an adjective. Protective values were often found in the literature, either in form of physical or intangible assets such as knowledge. What was lacking in most of the literature was formal processes of identifying these. Resilience or resilient-like frameworks were somewhat present, mostly found implicit. Limitations, generally occurring in half of the literature, were either referring to shortcomings of ERM or limitations of conducted studies, there was no clear framework regarding the subject of dealing with limitations. The questioning of underlying assumptions, referred to as background knowledge, was considered lacking in the ERM literature. Addressing or even recognizing so called black swan scenarios was the most absent aspect of the new risk perspective in the literature.

3 A Case study of the ERM-process at Kraftringen

The second part of the thesis consist of a case study conducted at Kraftringen. The following sections refer to answer the research question: *How can the ERM implementation at Kraftringen be improved with the results from the scoping study?*

Suggestions are made on how such improvements can be implemented in practice by the use of a proposition model. First an introduction is made regarding Kraftringen as a company and its current risk processes and the purpose of the ERM implementation at the company. Later sections provide the acquired model with the intent of making the implementation improved by providing insights from the covered articles.

3.1 Introduction

The following information regarding Kraftringen, which mainly constitutes of existing processes, was retrieved from meetings, correspondence and internal documents provided by contact persons at the company.

Kraftringen AB is currently changing its previously siloed risk management processes into one ERM process. As previously described, Kraftringen is exposed to a vast number of risks e.g. economic, market and safety risks that stretches across the organization in different areas. Kraftringen have several physical assets in the form of power plants, electrical grid, electrical transformers which all need securing operations and be running as desired. Kraftringen is implementing ERM with the ambition to gain a holistic risk management process that stretches across the organization. Moreover, risk is to be considered as a natural part in decision-making within the company, whether if it is business oriented strategic decisions or a part of day-to-day operations. The primary goal is to actively govern, and control individual risks while the total risk exposure is always to be considered in relation to business objectives.

Below are several of the risk areas faced by Kraftringen presented, the list does not cover all risk areas present. The purpose of the table is to give an oversight over some risk areas and its control functions. In the following section design proposition, a few of these areas are covered within the proposed model.

Table 2. Example of a few risk exposure and control process at Kraftringen.

RISK AREA	CONTROL FUNCTION
ENERGY TRADING	Risk handbook for energy trading
BUSINESS RISKS	Guidelines regarding risk management
IT AND INFORMATION SECURITY	IT and information security handbook
SAFETY	Safety handbook
CRISIS MANAGEMENT	Safety handbook
STRATEGIC RISKS	Guidelines regarding risk management
GLOBAL AND MARKET RISKS	Guidelines regarding risk management
CONTINUITY PLANNING	Under development

The ERM-model developed by Kraftringen is based upon the ISO 31000 framework regarding risk management process. Furthermore, Kraftringen will develop an own framework with definitions and support from ISO 31000.

The risk management process at Kraftringen is desired to be of generic nature. Hence, the process could be adaptable and applicable in any part of the entity's processes and activities i.e. the company could reach coherence in how to deal with risks. By implementing ERM, Kraftringen have the ambition to achieve the following goals regarding its risk management process:

- Increase the ability to achieve strategic goals.
- Making risk management an integrated part of the business processes that will benefit decision-making regarding business objectives.
- A common structure and process regarding risk.

In the current implementation plan for the ERM-process at Kraftringen. A pilot-project has been launched, targeting the business area of "district heating and cooling" as one of the areas for initially implementing ERM. The choice of district heating and cooling are motivated partly by the vast variety of risks facing the business area e.g. safety risks, supply of heating and cooling to customers, integrate environmental policies and business risks etc.

3.2 Methodology

Below follows a description over the "design proposition model" used for concretizing a possible approach to complement the current implementation of ERM at Kraftringen. The idea of the model was chosen in part to address what was pointed out in the scoping study, that ERM can be a bit vague, but also as means to make it easier for its practitioners to get a sense of direction and "what to do" inside the concept itself.

As described by Denyer, Tranfield, and Van Aken (2008) management and organizational research has increased over the years. But it is still quite fragmented, and some critique can be aimed towards the research being too descriptive, analytical and preoccupied with theoretical knowledge at the expense of solving the actual problem (Denyer et al., 2008). This has been identified in the scientific literature surrounding ERM and the new perspective on risk management in the scoping literature section. Hence, a design proposition can be used for making a possible design proposition in order to concretize a way of implementing ERM at Kraftringen. A design proposition constitutes of the logical form "if you want to achieve outcome (O) in context (C), then use intervention type (I)" (Denyer et al., 2008; Romme, 2003). It is important that design proposition lead to the desired effect. Hence, proposing and motivating *why* the proposition work is essential (Tehler & Brehmer, 2013).

3.3 Design proposition

In the following section the design proposition regarding the ERM implementation at Kraftringen is presented. First follow a general description of how the model suggestion is intended to work and second a practical example of the current implementation at the unit of district heating and cooling follows. Later, possible scenarios are treated for showing how results from the scoping study, "interventions", could work in practice. The section follows the logical form that the designed outcome (O) is to propose a holistic ERM model in the context (C) the business areas of Kraftringen with the intervention (I), being selected results and conclusions from the scoping study, summarized in Table 1.

Following the design proposition, a scenario analysis of two fictional risk scenarios will be presented to display the capability of the ERM structure to handle disturbances and assess threats.

3.3.1 Holistic model

The design proposition is a Holistic model, a circle depicting the “layers” of ERM at Kraftringen, see Figure 17. The company is represented by a disc consisting of three levels. Strategical, managerial, and operational level. The strategical “blunt end” of the entity is within the core and the “sharp end” being the outer edge of the disc. The closer to the outer edge, the more detailed, descriptive, and specific the processes are. Close to the core, the processes are more normative. The disc is also split into four sectors representing the business units of the company. Namely Grid & Infrastructure, Electricity and gas exchange, Power supply & street lighting and district heating & cooling (Sv: Nät, El- & gashandel, Elkraft & belysning samt Värme & Kyla).

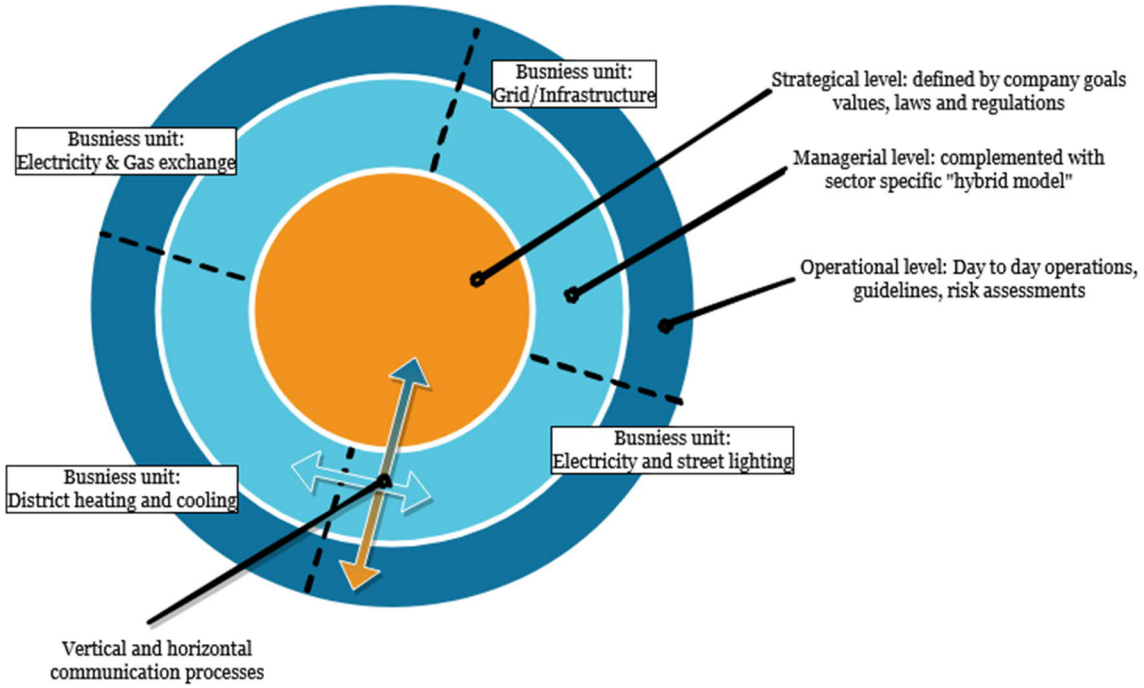

Figure 17 – Proposal of a holistic, generic ERM structure at Kraftringen. Consisting of three levels, Strategical, Managerial and Operational. Divided into the four business units of the company. Source: Adaptation of assembled information provided by Kraftringen.

The purpose of the sectors is to provide domain specific enhancements in terms of supporting models or domain specific practices. While the company itself share one set of core values and abide under the same laws and jurisdictions, represented by the inner core, differences will exist in terms of managerial decisions and shaping of processes and strategies concerning day to day operations in the outer edge. The sectoral division will hopefully make the ERM concept sensitive to what Schiller and Prpich (2014) refers to as organizational context. As discussed in 2.5.5-Hybrid models for enhancing ERM, by providing a form of organizational intra-boundary, a complementing model is easier to apply for each a specific sector without being enforced on areas not suitable for its purpose.

In section 2.6.3-Holistic results from the scoping study regarding the holistic aspect of ERM is discussed. Generally, the view can be split in two viewpoints and in some cases a combination of the two: A holistic framework of an organization, or a holistic framework in terms of dealing with “all risks”. The latter part is a bit too normative and is not really producing something tangible. In the case study the holistic definition as in “enterprise holistic framework” is chosen and focus is on producing a model illustrating the risk management processes of the entity containing all its various levels and sectors.

Below follows a description of the involved actors in each level as well as their shaping of the holistic risk management process.

Strategical level

Involved actors: Chief Risk Officer, Risk Manager, CEO, Board et cetera. Apart from conducting organizational hierarchical tasks, the risk management process in this tier is to define strategical goals, establish protective values and provide governance for the outer sections of the entity, in the model represented by the outward layers.

As discussed in section 2.6.6-Protective values. ERM and risk management processes are often to “risk-centric”, i.e. there is too much focus on risk and whatever consequences the risks might have on the entity, operations or valuable assets. This might lead up to a less pro-active and more reactive management of risks. To draw some value from the results of the scoping study, we stress the need of strategical management to define what processes are value-creating or what assets of the company are held the most valuable. If the risk management processes are to be carried out across the entire entity, the need for a clearly stated purpose and defined goals is essential. Otherwise it might end up being arbitrary between its practitioners, not bringing any value to the entity since some resources might be allocated, due to misunderstanding, in protecting something that is not value creating.

A way to concretize the view on risks by Kraftringen, is to link risks to business objectives e.g. key figures (Sv: nyckeltal) and Safety Performance indicators (SPI) e.g. no damage to either personnel or property. By doing this it is possible to anchor the purpose of ERM. Hence, a major part of the identified problems surrounding ERM from the scientific literature can be dealt with i.e. making it less ambiguous and more connected with organizational objectives. Thus, the possibility of the organization as a whole can work towards the same set of goals is achieved.

Managerial level

The managerial level is critical for ensuring organizational goals and to make values as an integrated part of the risk management process. The link between the strategical blunt end, and the operational sharp end could be consisting of middle management, business unit executives (sv: verksamhetsansvariga) and other selected positions. Degrees of freedom should be granted ensuring appropriate measures to be implemented in the sectoral shaping of the risk management processes.

Complementary models suited for the field of application could be what is already being done by Kraftringen, Business Continuity Planning (BCP). These complementary models will help shape the risk management process so each business unit can fulfill its obligations or function towards the organizational strategical goals and objectives with regards to the sectorial context. A business unit concerned with running operations are more suited to a BCP model while other sectors probably have better suited models and theories shaping their detailed risk management operations.

Operational level

The outermost segment of the disc. This is where day to day operations take place, it could be represented by e.g. the technicians running a plant or the company service desk managing customers. Risk management procedures are in this level highly detailed but coherence between the sectors is still possible. By sharing the safeguarding of the defined goals, objectives and values provided by the strategical core. The shaping of such processes could be described as mentioned in section 2.5.5-Hybrid models for enhancing ERM with the flowchart of risk management proposed by the authors Bogodistov and Wohlgemuth (2017).

An important and informal process is taking place in this level is the ad hoc management of emerging risks. Often smaller in terms of impact and consequence, but nevertheless an ongoing risk management process. The process is according to the authors Bogodistov and Wohlgemuth (2017) important in handling risks. Similar is the reasoning by Schiller and Prpich (2014) that informal risk management and communication takes place in this “informal” setting and is important in the exchange of tacit information regarding risks.

Communicational channels

The communicational processes can be divided into two categories, the vertical and horizontal. The main purpose is to achieve integration between existing practices and communicate risk across the company sectors and levels.

The vertical communication is to create a top-down driven risk management process stemming from previously mentioned defined goals and values. A possible way to achieve this is through control and compliance complemented with risk and decision awareness. Since communication is a two-way process, it is also a bottom-up driven process of

reporting identified risks related to the operations. This enables the company to create the "risk-portfolio" of collected exposure. As described in 2.6.9 -Communication, the authors Sax and Torp (2015) points to the importance of a bottom-up driven process for identifying risks.

The horizontal communication take place in all layers of the entity. The purpose is to ensure commensuration and monitoring of perceived risks and that the same risk is not handled twice by different sectors. As discussed in 2.6.9 - Communication the authors Schiller and Prpich (2014) stresses the importance of the transfer of both tacit and explicit knowledge to achieve successful communication of risks, uncertainties and ambivalences.

As previously mentioned, raising risk awareness could be a possible solution to deal with the aspects of "uncertainties" and "black swan events" from the new risk perspective. "Risk awareness", as normative as it may sound, is found in what the scientific literature describes as risk culture by Agarwal and Virine (2018) or what Stoll (2015) refers to as organizational culture. The tone of this culture, according to Stoll, is set by top management. Kraftringen is already committing to the work of dealing with uncertainties through their five-year prognosis of results per investment and rendering of worst, best and probable scenario outcome. When it comes to dealing with "black swan events" we draw on the proposition by Makarova (2017), the concept is important to frame and put into all levels of decision making. Every risk manager, reporting instance or decision maker should take into consideration: what have not been covered that in hindsight will seem obvious?

Reoccurring events are usually reported in a formal incident reporting system (sv: tillbudsrapportering). Captured and stored in the organizational memory, this provides a great opportunity for single- and double loop learning. If recorded incidents and near misses are properly communicated and processed, they might help to avoid future disruptions. It might even bring changes in underlying risk assumptions. Assumptions in which are setting the goals, values and strategies related to the ERM process. Double loop learning is considered one way to represent the aspect "background knowledge" from the new risk perspective. As previously discussed in section 2.6.4-Background knowledge, or rather the questioning of established assumptions of risk, is an aspect fairly lacking in the ERM literature and the possible studied implementations. There are more ways to obtain information to drive the development of risk management at Kraftringen, the incident report system is just one of the channels. The importance is to have this function recognized and not just being a mandatory library of near misses and incidents.

3.3.2 Practical example - Business unit district heating and cooling

A practical example of the proposed ERM model is presented for the business unit of district heating and cooling, see Figure 18. The details in the example are derived from internal documentation provided by Kraftringen as well as meetings and guidance from the current risk manager at the company. The specific details are not static.

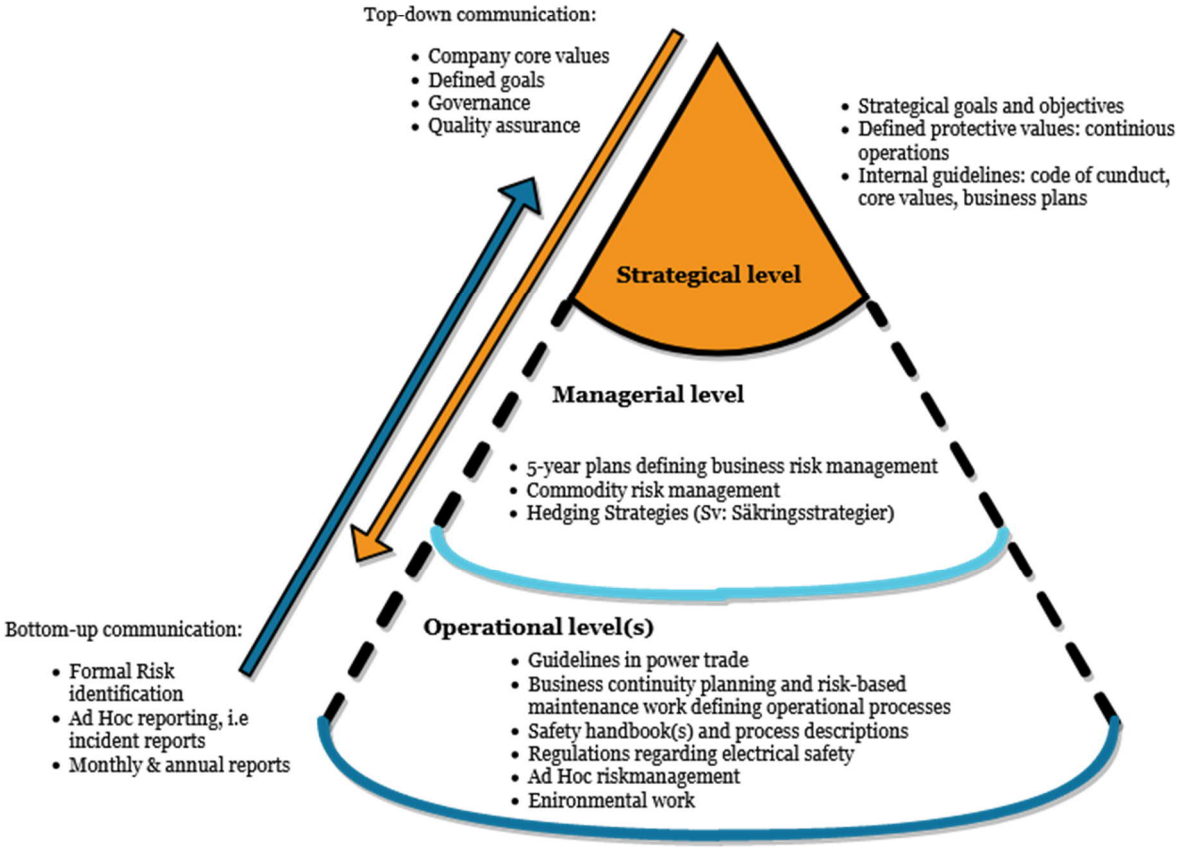

Figure 18 – A holistic design illustration, based on the current ERM structure of the business unit: district heating and cooling. Source: Adapted illustration based on information and design provided by Kraftringen.

Strategical level:

The company have an array of defined goals. For the use of the proposed model, the goal "deliver sustainable and stable energy in the region" was chosen. Thus, the defined goal and protective value are providing sustainable and a stable energy supply. The risk management process on the strategical level is to ensure the functions of the business unit abiding rules and regulations and adhere to company defined goal. The preexisting roles and functions in the entity would presumably be executives, the chief risk responsible and the board.

Managerial level

The company 5-year plans define what the entity is undertaking and establishes financial goals. Business risk and other risk managerial processes is carried out in adherence to the financial objectives.

The risk management processes at the managerial level consist of project risk, commodity risk management defining hedging strategies (sv: säkringsstrategier) in power trade.

Preexisting functions would probably be in terms of HSSEQ (Health Safety Security Environment and Quality) safety representatives (sv: skyddsombud) and Human Resource Management.

Operational level(s)

To adhere the defined goal and protective values, a suitable complementary model for the operational context is chosen. The model in this case would be Business Continuity Planning (BCP). With the motivation of the business unit being operational in its nature. As discussed in section 2.8.1-General discussion, BCP revolves around the continuity of core processes and shaping of an organization that quickly mitigates disruptions to resume normal operations. A key feature in achieving this, according to the authors Gifuna and Karydasb (2010), is the ability to "know the capabilities, limitations and vulnerabilities of a system and its personnel". Tied to the BCP aspect is what Kraftringen refers to as risk-based maintenance. This would be in defining the day-to-day operations e.g. "what would the damage be to our customers if this pipe breaks?".

As previously mentioned, the operational level consists of roles and responsibility closest to everyday operations. Formal risk management processes are stemming from risk-based maintenance work as well as risks associated to the 5-year plan. Risks are top-down communicated through for example, guidelines in power trade, educational training, and handbooks. Risk management processes at this level also handles environmental risks, both in terms of work environment and environmental legislation.

Risk management activities at this level would be technical analysis of failure rates of components within the technical systems. Currently, the process is relying on the opinions and quantifications of operational personnel. Risks concerning the trade of electricity, gas and oil are also handled here. Future risk management, planned by Kraftringen regarding the energy trade, would be a live feed interface monitoring weather forecasts, fuel prices and the current price of electricity.

3.3.3 Scenario analysis

For further clarification on how the proposed model would practically work two hypothetical scenarios regarding disruptions are provided below. The scenarios are supposed to show the breadth of the model and highlight which parts of ERM and the new risk perspective that becomes active in case of different disturbances.

Scenario 1 – Fire in fuel pile at central heating plant:

Before going into the furnace at the central heating plant, fuel is stored in piles outside the loading unit of the facility. A fire starts since loading operators have piled fuel too high. The fire is put out, but this takes great effort since the pile needs to be spread out by a wheel-loader and hosed with water. This is handled on site by the personnel and for about two hours the furnace cannot be loaded. Without fuel in the furnace, it shuts down to spare the turbine generating electricity. Once powered down it takes a few days to get it back to operation temperature. No electricity or central heating is distributed from the plant during that time. A small mistake, the fact that furnace fuel was stapled to high quickly spread through the entire company and caused damage in the form of lost revenue. This event happens from time to time and usually when the staff constellation, which changes from shift to shift, consists of personnel with only a few years of working experience at Kraftringen.

Solution: Risk communication and double loop learning to prevent future incidents

The business continuity aspect of ERM, with focus on the continuous operations and limitations within the company, produces operational guidelines in adherence to recorded incidents. Looking at the incident in hindsight it is concluded that the fuel was piled to the height where auto-ignition was made possible. Single loop learning is most likely taking place at the working shift that day, they saw the result of piling fuel to high caused a fire and disturbance to an objective related to ERM, the continuous operation of the plant. In order to avoid the same mistake with a different staff constellation, it is embedded in the staff introduction that piling fuel to high is prohibited due to the fire hazard. To achieve double loop learning change needs to be based on questioning and reevaluation of underlying assumptions. The organization addressed the problem with new work routines. In order to avoid similar events, the managerial and strategical communication conveyed the risk posing to the entire entity in case of plant downtime, economical risk due to lost revenue, insurance claims etc. The staff, who considered the incident small, was informed of the much bigger impact the incident had on the company and its clear connection to the company defined protective value of continuous operation. Due to the clear understating at the operational level of the problems associated with a fire at the loading area, staff saw beyond the written instructions and started identifying risks ad hoc, such as visitors smoking at the loading area or temporal and part time workers not allowed operate machinery which could start another fire. The safety culture was increased and the ERM concept, with its clear connection to enterprise-wide incidents managed to create double loop learning resulting in the change of underlying risk assumptions.

Scenario 2 - Cyber-attack

A malware is planted within the IT-system of Kraftringen through an email sent to an employee who works within one of the business areas. The malware locks an essential part of the payment system owned by Kraftringen. The customers of the company cannot receive their bills in time and either pay them. The disturbance is bad news for Kraftringen, losing market shares is not an option and the reputational damage is expected to be severe as well as the loss in revenue. Cyber-attacks have been listed as a potential risk. Why is not a safety system in place? At the strategical level, the possibility of cyber-attacks had been listed as a potential risk. The frequency and occurrence of such an event was not easily available and thus the possibility of the risk was deemed unlikely.

Solution: Acknowledgement of black swan events and management of uncertainties

Turning back the clock to before the incident: When assessing the risk of cyber-attacks, the responsible manager for IT security deemed the frequency as unlikely, as it had never at the company before. Before deciding of accepting the risk and moving on with the analysis, the manager looked at the company crib sheet (Sv: lathund) in decision making. Last on the list is “Black swan scenario”, “what have not been thought of that in hindsight will seem obvious”. Cyber-attacks in form of extortion malware were something that happened to other companies and even though it would be the first time for Kraftringen, it could be fully plausible. Instead of quantifying the risk from statistics, statistics that was unavailable to Kraftringen due to no earlier incidents, the probability was set to “likely”. Since the ERM process at Kraftringen not only relies on listed and previously experienced events, the potential threat was taken into consideration. Uncertainty about the incident rate of an event would not lead to neglecting or accepting the risk. Through informed, risk-based decision making, acknowledging what potentially could go wrong, identifying a black swan event before it took place. The company acquired a software protection in time that prevented opening of the malicious e-mail.

3.4 Discussion

The following section refer to the proposition regarding the holistic model and to motivate the reasons why the proposition will work.

The proposed model and suggested implementation are supported by arguments and conclusions drawn from the scoping study results. There is reason to believe implementing ERM by using a holistic model is a good idea. Reaching coherence within the organization is also an important aspect of ERM and should be included in the model. Furthermore, the proposed model will make Kraftringen sensitive to organizational context, as the model allows to be tailormade for each specific sector without being a "one-size fits all" solution. A common misconception found within the scientific literature was that ERM was mainly a compliance tool.

Clear stated objective

It might come off as stating something obvious but having clear stated objectives cannot be stressed enough. Thus, avoiding arbitrary interpretations which could lead to inconsistencies in the risk management process. Anchoring objectives in relation to risks is not easy. Results from the scoping study present various suggestion e.g. key risks, VRIN with the overall objective to state what risks matter rather than creating an indefinite number of risks that might affect the entity. By doing so a bit of the ambiguity surrounding ERM can be dealt with i.e. connecting organizational objectives with risks and anchoring the purpose within the whole organization. An important part handling this would be to make employees a part of the process. Communicating the purpose of risk management and allow the information to flow back and forth from sharp-end to blunt-end operations.

Systemize knowledge and communication

A central and yet lacking part of ERM would be its treatment of knowledge. A goal for any organization implementing ERM should be in how the entity manage the organizational learning, developing from anticipated and experienced risks. Learning from both sharp and blunt end operations is considered important. As seen in the proposition model a communication process making such ends of district heating and cooling possible might harvest the existing knowledge within the business area. In the scenario an example is provided for emphasizing the possible benefits of single- and double loop learning. A key point is to storage and document knowledge-based decisions. Having a process present making this possible would prevent future disruption and increase organizational learning. The intervention being treating knowledge by allowing single- and double-loop imbedding it within the organization making it reach the objective of providing core processes without disturbance.

Finally, we draw on the proposition that it is important to frame informed and risk-based decision making. Every risk manager, reporting instance or decision maker should take into consideration: what have not been covered that in hindsight will seem obvious. What underlying assumptions needs to be challenged and reevaluated.

Final proposition

So, to the question, how do we know this will work? Well, whatever is labeled to work is usually something measured in monetary terms. How do you quantify fingers not being cut off or reputational damage not being done? While we cannot assess the ERM implementation at Kraftringen through observations, statistical analysis, experiments, or black box testing we take on a more descriptive approach. Using an informed argument, in this case through the scenario analysis, we argue with support from the studied literature findings that the ERM implementation is capable of dealing with disruptions and being an effective risk management framework.

Limitations

A studied aspect of the new risk perspective, it would be embarrassing if not mentioned here. The proposed model is not without limitations. One of them being that it leaves out details about specific risk management processes in general. Just like the massive COSO framework, we leave the details to those that actually carry out the operational tasks, those that “know” and on a day-to-day basis are exposed to the risks.

For a company of the size of Kraftringen, dividing the model into four sectors is probably viable. Applying this to a much larger entity, the sectoral division will probably be much fuzzier and generalizing. The risk of risk management ending up in siloed practices, is once again imminent since the sectorial differences are too big.

Conducted by a different set of people, it is natural that a different approach, and different interventions might have been suggested. Most quantitative parts of the analysis, such as presence or absence of terms and definitions are however considered solid. There is only one way of counting how many times a word is being typed. The selection of these words is a different topic. The framing of the scoping study is from the perspective of risk management from an engineering point of view, derived from a safety concept rather than a financial view, and thus focusing on what is being taught and supervised at engineering school.

Not covered topics in the model

The aspects “robustness” and “resilience” are not covered in the proposed model. Starting with robustness, the results from the study mostly turns out to be sheer use of the word and a magic formula to throw at a company to make its ERM more robust has not been found.

The second topic, resilience, turned out similar as robustness, mostly used as a buzz word or adjective. The definition proposed in section 2.6.7-Resilience as the abilities to: anticipate, recognize, adapt, and learn. Resilience according to this definition is rather an emerging property than an individual process that turns the company "resilient". Kraftringen might be a fully resilient company just as well as it might not in this moment. This could be the topic for future research if someone wish to find the answer to that question. However, the scientific literature has revealed a vast number of ERM implementations and frameworks have turned out not to be resilient, or at least lacking the word expressed in any form.

3.5 Conclusion

What we have strived to achieve in the past section is the following: *How can the ERM implementation at Kraftringen be improved with the results from the scoping study?* We summarize in short how the question has been answered:

- A Holistic model, in terms of all-departments, have been presented. A model complemented with what we refer to as “hybrid models” to make it more sensitive to organizational and industrial context, in this case, the context of the business unit district heating and cooling.
- The importance of the ERM process at Kraftringen to be value centric, i.e. first strategically defining and focusing on what is value-creating rather than letting identified risks define what is held valuable.
- How to shape a top-down and bottom-up risk communication channels and what should be transferred in-between the “layers” of the ERM structure.
- How to increase awareness of uncertainties and black swan events, to improve the decision-making processes.
- How the risk management process benefits from single and double loop learning.
- How the intended ERM model at Kraftringen handles two hypothetical risk scenarios.

4 General conclusion

Based on findings within the scientific literature and experiences from the case study at Kraftringen – what lessons can be learned?

The new perspective on risk management include valuable aspects, treating certain aspect often neglected in ERM practices. To acknowledge these aspects e.g., uncertainties, holism, communication and knowledge, a better ERM process is thought to be attained. The scientific literature showed ambiguity in practical ERM implementations. In retrospect, this is hardly surprising. But does it really matter? For organizations, like Kraftringen, an own ERM process is created with support of existing frameworks. This approach could better acknowledge the lacking aspects of ERM and allow a customized risk process. Thus, bringing the intended value for Kraftringen and overcoming the possible "illusion of control" formalized guidelines would bring. It shall also be noted that an ERM-process must be evolved over time as it will not solve everything at once. By managing the process step-by-step, as Kraftringen intend to do, with launching of pilot-projects, a mature ERM will grow into the organization.

Another important result is to harvest and storage knowledge. As scenario analysis revealed, organizational learning is possible. With small means, a more solid management of risk can be attained. This can result in coherence of how risks are defined and understood in the organization, by storing different judgements made by for example, employees at the sharp end of operations. A better understanding of behavioral judgements can be drawn. The knowledge of past judgements is imbedded within the organization, ultimately to be used when need for future judgements arise.

References:

Aaabo, T., Fraser, J. R. S., & Simkins, B. J. (2005). The Rise and Evolution of the Chief Risk Officer: Enterprise Risk Management at Hydro One. *Journal of applied corporate finance, 17*.

Abkowitz, M. D., & Camp, J. S. (2011). An application of enterprise risk management in the marine transportation industry C3 - WIT Transactions on the Built Environment. doi:10.2495/DMAN110201

Abkowitz, M., & Camp, J. (2017). Structuring an enterprise risk assessment protocol: Traditional practice and new methods. *Risk Management and Insurance Review, 20*(1), 79-97.

Agarwal, R., & Virine, L. (2018). Integration of project risk management (PRM) into enterprise risk management (ERM). *Global Business Expansion: Concepts, Methodologies, Tools, and Appl.* doi:10.4018/978-1-5225-5481-3.ch067

Althobaiti, W. A., & Aloraini, S. A. (2019). Toward Optimum Resiliency: Practical Alignment of BCM and ERM Processes C3 - 2019 4th International Conference on System Reliability and Safety, ICSRS 2019. doi:10.1109/ICSRS48664.2019.8987615

Althonayan, A., & Andronache, A. (2019). Resiliency under strategic foresight: The effects of cybersecurity management and enterprise risk management alignment C3 - 2019 International Conference on Cyber Situational Awareness, Data Analytics and Assessment, Cyber SA 2019. doi:10.1109/CyberSA.2019.8899445

Altman, W., & Cooper, C. (2004). Integrating enterprise-wide risk management. *Engineering Management*. doi:10.1049/em:20040501

Amin, Z. (2019). A practical road map for assessing cyber risk. *Journal of Risk Research*. doi:10.1080/13669877.2017.1351467

Arena, M., Arnaboldi, M., & Azzone, G. (2010). The organizational dynamics of Enterprise Risk Management. *Accounting, Organizations and Society*. doi:10.1016/j.aos.2010.07.003

Arena, M., Arnaboldi, M., & Palermo, T. (2017). The dynamics of (dis) integrated risk management: A comparative field study. *Accounting, Organizations and Society, 62*, 65-81.

Arksey, H., & O'Malley, L. (2005). Scoping studies: towards a methodological framework. *International Journal of Social Research Methodology, 8*(1), 19-32. doi:10.1080/1364557032000119616

Ashby, S., Buck, T., Nöth-Zahn, S., & Peisl, T. (2018). Emerging IT risks: insights from German banking. *The Geneva Papers on Risk and Insurance-Issues and Practice, 43*(2), 180-207.

Aven, T. (2011). On Some Recent Definitions and Analysis Frameworks for Risk, Vulnerability, and Resilience. *Risk Analysis, 31*(4), 515-522. doi:10.1111/j.1539-6924.2010.01528.x

Aven, T., & Ylönen, M. (2018). A risk interpretation of sociotechnical safety perspectives. *Reliability Engineering & System Safety, 175*, 13-18. doi:10.1016/j.ress.2018.03.004

Bates, K., Filippini, R., Lai, I. K., & Lau, H. C. (2012). A hybrid risk management model: a case study of the textile industry. *Journal of Manufacturing Technology Management*.

Beasley, M., Branson, B., & Pagach, D. (2015). An analysis of the maturity and strategic impact of investments in ERM. *Journal of Accounting and Public Policy*. doi:10.1016/j.jaccpubpol.2015.01.001

Becker, P. (2014). *Managing risk and resilience for sustainable development*. Amsterdam, The Netherlands: Elsevier.

Beerens, R. J. J., & Tehler, H. (2016). Scoping the field of disaster exercise evaluation-A literature overview and analysis. *International Journal of Disaster Risk Reduction, 19*, 413-446.

Bogodistov, Y., & Wohlgemuth, V. (2017). Enterprise risk management: a capability-based perspective. *Journal of Risk Finance*. doi:10.1108/JRF-10-2016-0131

Bromiley, P., McShane, M., Nair, A., & Rustambekov, E. (2015). Enterprise Risk Management: Review, Critique, and Research Directions. *Long Range Planning, 48*(4), 265-276. doi:10.1016/j.lrp.2014.07.005

Burnaby, P., & Hass, S. (2009). Ten steps to enterprise-wide risk management. *Corporate Governance: The international journal of business in society*. doi:10.1108/14720700910998111

Cedergren, A., & Hassel, H. (2018). A risk assessment framework for land use planning.

COSO, C. o. S. O. o. t. T. C. (2004). Enterprise Risk Management - Integrated Framework: Executive Summary. In.

Daudt, H. M. L., van Mossel, C., & Scott, S. J. (2013). Enhancing the scoping study methodology: a large, inter-professional team's experience with Arksey and O'Malley's framework. *BMC Medical Research Methodology, 13*(1), 48. doi:10.1186/1471-2288-13-48

De Souza, R. S., Da Silva Gomes, S. M., Bruni, A. L., De Oliveira, G. G., Sampaio, M. S., & De Faria, J. A. (2012). Enterprise risk management and performance improvement: A study with brazilian nonfinancial firms. *Studies in Managerial and Financial Accounting*. doi:10.1108/S1479-3512(2012)0000025014

Denyer, D., Tranfield, D., & Van Aken, J. E. (2008). Developing design propositions through research synthesis. *Organization studies, 29*(3), 393-413.

Gatzert, N., & Martin, M. (2015). Determinants and value of enterprise risk management: Empirical evidence from the literature. *Risk Management and Insurance Review*. doi:10.1111/rmir.12028

Gatzert, N., & Schmit, J. (2016). Supporting strategic success through enterprise-wide reputation risk management. *The Journal of Risk Finance*.

Gifuna, J. F., & Karydasb, D. M. (2010). Organizational attributes of highly reliable complex systems. *Quality and Reliability Engineering International*. doi:10.1002/qre.1034

Green, P. E. J. (2016). Introduction to Risk Management Principles. *Enterprise Risk Management: A Common Framework for the Entire Organization*. doi:10.1016/B978-0-12-800633-7.00001-8

Hassler, M. L., Andrews, D. J., Ezell, B. C., Polmateer, T. L., & Lambert, J. H. (2020). Multi-perspective scenario-based preferences in enterprise risk analysis of public safety wireless broadband network. *Reliability Engineering and System Safety*. doi:10.1016/j.ress.2019.106775

Hossein Nezhad Nedaei, B., Abdul Rasid, S. Z., Sofian, S., Basiruddin, R., & Amanollah Nejad Kalkhouran, A. (2015). A contingency-based framework for managing enterprise risk. *Global Business and Organizational Excellence*. doi:10.1002/joe.21604

Jankensgård, H. (2019). A theory of enterprise risk management. *Corporate Governance (Bingley)*. doi:10.1108/CG-02-2018-0092

Kasim, M. A. B., Aziz, A. A., & Kasim, I. B. (2012). COULD ENTERPRISE RISK MANAGEMENT (ERM) ENHANCE SHAREHOLDERS'WEALTH?: THE LESSON FROM CREDIT CRUNCH. *Current Politics and Economics of South, Southeastern, and Central Asia, 20*(1), 12.

Kraftringen. (2018). Retrieved from https://www.kraftringen.se/om-kraftringen/om-oss/foretagsfakta/kort-om-oss/

Kramer, R. M. (2005). A Failure to Communicate: 9/11 and the Tragedy of the Informational Commons. *International Public Management Journal, 8*(3), 397-416. doi:10.1080/10967490500439867

Kurdi, I. A., Naji, A. F., & Naseef, A. N. (2019). Enterprise risk management and performance of financial institutions in Iraq: The mediating effect of information technology quality. *Journal of Information Technology Management*. doi:10.22059/jitm.2019.74764

Lee, L. S., & Green, E. (2015). Systems thinking and its implications in enterprise risk management. *Journal of Information Systems*. doi:10.2308/isys-51047

Leech, T. (2018). REINVENTING ERM TO SUPPORT BETTER DECISION MAKING. *Edpacs*. doi:10.1080/07366981.2018.1541227

Lin, Y., Wen, M.-M., & Yu, J. (2012). Enterprise risk management: Strategic antecedents, risk integration, and performance. *North American Actuarial Journal, 16*(1), 1-28.

Lundqvist, S. A. (2014a). *Abandoning Silos for Integration: Implementing Enterprise Risk Management and Risk Governance.* Lund University, Lund.

Lundqvist, S. A. (2014b). An exploratory study of enterprise risk management: Pillars of ERM. *Journal of Accounting, Auditing and Finance*. doi:10.1177/0148558X14535780

Makarova. (2017). How to organize the efficient ERM model in non-financial companies and evaluate it efficiency in respect of corporate governance. *Journal of Business and Retail Management Research, 11*(3).

Mensah, G., & Gottwald, W. (2015). Enterprise risk management: Factors associated with effective implementation. *Available at SSRN 2735096*.

Nielsen, S., & Pontoppidan, I. C. (2019). Exploring the inclusion of risk in management accounting and control. *Management Research Review*. doi:10.1108/MRR-10-2017-0342

Nocco, B. W., & Stulz, R. M. (2006). Journal of applied corporate finance - Enterprise Risk Management theory and practice. *Journal of applied corporate finance, 18*.

O'Donnell, E. (2005). Enterprise risk management: A systems-thinking framework for the event identification phase. *International Journal of Accounting Information Systems, 6*(3), 177-195.

Rana, T., Wickramasinghe, D., & Bracci, E. (2019). New development: Integrating risk management in management control systems—lessons for public sector managers. *Public Money and Management*. doi:10.1080/09540962.2019.1580921

Rodriguez, E., & Edwards, J. S. (2015). Knowledge management in support of enterprise risk management. *Transportation Systems and Engineering: Concepts, Methodologies, Tools, and Applications*. doi:10.4018/978-1-4666-8473-7.ch005

Romme, A. G. L. (2003). Making a difference: Organization as design. *Organization science, 14*(5), 558-573.

Sax, J., & Torp, S. S. (2015). Speak up! enhancing risk performance with enterprise risk management, leadership style and employee voice. *Management Decision*. doi:10.1108/MD-10-2014-0625

Schiller, F., & Prpich, G. (2014). Learning to organise risk management in organisations: What future for enterprise risk management? *Journal of Risk Research*. doi:10.1080/13669877.2013.841725

Sidorenko, A. (2019). 30 PRACTICAL STEPS TO IMPLEMENT RISK MANAGEMENT 2. FOLLOW THESE STEPS TO INTEGRATE RISK MANAGEMENT INTO DECISION-MAKING, PROCESSES AND CULTURE. *Edpacs*. doi:10.1080/07366981.2019.1661964

Stoll, M. (2015). From information security management to enterprise risk management. In *Innovations and Advances in Computing, Informatics, Systems Sciences, Networking and Engineering* (pp. 9-16): Springer.

Taleb, N., N. (2007). *The black swan: the impact of the highly improbable*.

Tehler, H. (2020). *Introduktion till risk och riskhantering 20200818*. Avdelningen för Riskhantering och Samhällssäkerhet. Lunds Universitet.

Tehler, H., & Brehmer, B. (2013). Design inom olycks-och krishanteringsområdet med fokus på ledning. *Lunds Universitet, Lund*.

Tekathen, M., & Dechow, N. (2013). Enterprise risk management and continuous re-alignment in the pursuit of accountability: A German case. *Management Accounting Research*. doi:10.1016/j.mar.2013.04.005

Thekdi, S., & Aven, T. (2019). An integrated perspective for balancing performance and risk. *Reliability Engineering & System Safety, 190*. doi:10.1016/j.ress.2019.106525

Ting, J. S.-L., Kwok, S.-K., & Tsang, A. H.-C. (2009). Hybrid risk management methodology: A case study. *International Journal of Engineering Business Management*. doi:10.5772/6783

Wieland, A., & Wallenburg, C. M. (2012). Dealing with supply chain risks. *International Journal of Physical Distribution & Logistics Management, 42*(10), 887-905. doi:10.1108/09600031211281411

Appendix A: Studied literature

Below is all of the literature used for conducting the scoping study presented.

Title:	Auhor(s):	year:
Multi-perspective scenario-based preferences in enterprise risk analysis of public safety wireless broadband network	Hassler M.L., Andrews D.J., Ezell B.C., Polmateer T.L., Lambert J.H.,	2020
Why risk management frameworks fail to prevent wrongdoing	Schmidt C.,	2020
Toward Optimum Resiliency: Practical Alignment of BCM and ERM Processes	Althobaiti W.A., Aloraini S.A.,	2019
Exploring the inclusion of risk in management accounting and control	Nielsen S., Pontoppidan I.C.,	2020
30 PRACTICAL STEPS TO IMPLEMENT RISK MANAGEMENT 2. FOLLOW THESE STEPS TO INTEGRATE RISK MANAGEMENT INTO DECISION-MAKING, PROCESSES AND CULTURE	Sidorenko A.,	2019
A theory of enterprise risk management	Jankensgård H.,	2019
Resiliency under strategic foresight: The effects of cybersecurity management and enterprise risk management alignment	Althonayan A., Andronache A.,	2019
New development: Integrating risk management in management control systems—lessons for public sector managers	Rana T., Wickramasinghe D., Bracci E.,	2019
A practical road map for assessing cyber risk	Amin Z.,	2017
Enterprise risk management and performance of financial institutions in Iraq: The mediating effect of information technology quality	Kurdi I.A., Naji A.F., Naseef A.N.,	2019
REINVENTING ERM TO SUPPORT BETTER DECISION MAKING	Leech T.,	2018
Systems thinking and its implications in enterprise risk management	Lee L.S., Green E.,	2015
Speak up! enhancing risk performance with enterprise risk management, leadership style and employee voice	Sax J., Torp S.S.,	2015
Learning to organise risk management in organisations: What future for enterprise risk management?	Schiller F., Prpich G.,	2013
Knowledge management in support of Enterprise Risk Management	Rodriguez E., Edwards J.S.,	2014
The organizational dynamics of Enterprise Risk Management	Arena M., Arnaboldi M., Azzone G.,	2010
Organizational attributes of highly reliable complex systems	Gifuna J.F., Karydasb D.M.,	2009
Ten steps to enterprise-wide risk management	Burnaby P., Hass S.,	2007

A hybrid risk management model: A case study of the textile industry	Lai I.K.W., Lau H.C.W.,	2012
An analysis of the maturity and strategic impact of investments in ERM	Beasley M., Branson B., Pagach D.,	2015
An application of enterprise risk management in the marine transportation industry	Abkowitz M.D., Camp J.S.,	2011
An exploratory study of enterprise risk management: Pillars of ERM	Lundqvist S.A.,	2014
Could enterprise risk management (ERM) enhance shareholders' wealth?: The lesson from credit crunch	Kasim M.A.B., Hanafi S.R.B.M., Aziz A.A., Kasim I.B.,	2012
Determinants and value of enterprise risk management: Empirical evidence from the literature	Gatzert N., Martin M.,	2015
Enterprise risk management and continuous re-alignment in the pursuit of accountability: A German case	Tekathen M., Dechow N.,	2013
Enterprise risk management and performance improvement: A study with brazilian nonfinancial firms	De Souza R.S., Da Silva Gomes S.M., Bruni A.L., De Oliveira G.G., Sampaio M.S., De Faria J.A.,	2012
Enterprise risk management: A systems-thinking framework for the event identification phase	O'Donnell E.,	2005
Enterprise Risk Management: Strategic Antecedents, Risk Integration, and Performance	Lin Y., Wen M.-M., Yu J.,	2012
From information security management to enterprise risk management	Stoll M.,	2015
Hybrid risk management methodology: A case study	Ting J.S.-L., Kwok S.-K., Tsang A.H.-C.,	2009
The association between enterprise risk management and corporate governance quality: The mediating role of internal audit performance	Mohammad F., Al-Nimer M.,	2018
Integration of project risk management (PRM) into enterprise risk management (ERM)	Agarwal R., Virine L.	2017
The effect of the enterprise risk management quality on firm risks: A case of the South African Mining Sector	Zungu S., Sibanda M., Rajaram, R.	2018
Emerging IT Risks: Insights from German Banking	Ashby S., Trevor B,. Nöth-Zahn S,. Peisl T,.	2018
The dynamics of (dis)integrated risk management: A comparative field study	Arena M,. Arnaboldi M,. Palermo T,.	2017
How to organize the efficient ERM model in non-financial companies and evaluate it efficiency in respect of corporate governance	Makarova V,.	2017
Structuring an Enterprise Risk Assessment Protocol: Traditional Practice and New Methods	Abkowitz M., Camp J,.	2017

Enterprise risk management: a capability-based perspective	Bogodistov Y,. Wohlgemuth V,.	2017
Enterprise risk management: Factors associated with effective implementation	Gottwald ,. Mensah.	2015
Supporting strategic success through enterprise-wide reputation risk management	Gatzert N., Schmit J.	2015
Introduction to Risk Management Principles (Chapter 1 of the book above)	Green EJ P,.	2016
Knowledge management in support of enterprise risk management	Rodriguez E., Edwards S J,.	2014
A contingency-based framework for managing enterprise risk	Nedaei B., Rasid S., Sofian S,. Basiruddin R,. Kalkhouran A,.	2015