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Abstract

Companies' sustainability reporting rates have been increasing rapidly during the past decades as a response to stakeholders' growing interest towards sustainability impacts of the company activities. Sustainability is viewed in this thesis holistically through the dimensions of economic, environmental and social sustainability. The aim of this thesis is to create knowledge about sustainability reporting of the European pulp and paper industry from a supply chain perspective. The study reviews the sustainability reporting of pulp and paper industry between years 2010 and 2019. The thesis explores the appearing themes in the sustainability reports as well as tracks the development of the sustainability reporting.

A two-stage approach is adopted to address the research aim. First, a thorough review of relevant literature of sustainable supply chain management (SSCM), sustainability reporting and pulp and paper industry, is conducted. Then, sustainability reporting of the ten biggest pulp and paper companies in Europe is studied longitudinally using content analysis as the research method. Leximancer content analysis software was used to conduct the empirical analysis.

This thesis creates a research framework that can be utilized to study the connections between sustainability themes and concepts, and SSCM. The key findings are following: 1) in total eight themes appear regularly in the sustainability reports of pulp and paper industry, 2) production is a persistent topic in the sustainability reports, and 3) an increase in sourcing related topics can be observed. The findings provide evidence that the sustainability reports of pulp and paper industry emphasize the environmental dimension of sustainability. The social dimension, in contrast, has received considerably less attention during the observation period.

This thesis recommends that reporting of the supply chain sustainability should be broadened to include perspectives like product design, distribution and end-of-life functions. Especially the topic of distribution needs more coverage as it is missing completely from the current reports. In addition, broader reporting on the social impacts of the pulp and paper industry is needed.

Key words	sustainability reporting, SSCM, content analysis, Leximancer, pulp and paper industry
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Tiivistelmä

Yritysten vastuullisuusraportointi yleistyy ja kehittyy kovaa vauhtia. Vastuullisuusraportoinnilla pyritään viestimään organisaation toiminnan vaikutuksista sidosryhmiin ja ympäristöön. Vastuullisuusraportissa kerrotaan yrityksen taloudellisista vaikutuksista, yrityksen toiminnan vaikutuksista ympäristöön sekä yrityksen toteuttamista käytänteistä sosiaalisen vastuun parantamiseksi. Tutkimuksen tavoitteena oli tuottaa tietoa vastuullisuusraportoinnista sellu- ja paperiteollisuudessa keskittyen tarkastelemaan toimitusketjujen näkökulmaa. Tutkimus pyrki tunnistamaan usein esiin nousevia teemoja sisällönanalyysin kautta sekä tarkastelemaan raportoinnin sisällön kehitystä vuosina 2010-2019. Tutkimuksen aineisto koostui kymmenen suurimman eurooppalaisen pörssilistatun sellu- ja paperiteollisuuden yrityksen vastuullisuusraporteista viimeisen kymmenen vuoden ajalta. Sisällönanalyysi toteutettiin koneoppimista hyödyntävän Leximancer -ohjelmiston avulla. Ohjelmiston luomat konseptikartat analysointiin kirjallisuuskatsauksen pohjalta rakennettuun teoreettiseen viitekehykseen tukeutuen.

Tutkimuksen tulokset osoittavat, että sellu- ja paperiteollisuusyritysten raportoinnissa korostuu kahdeksan teemaa. Yleisin teema on tuotanto. Tuotantoon liittyvä raportointi on ollut kattavaa koko tarkasteluvälin ajan. Hankintaan liittyvä raportointi sen sijaan on laajentunut tarkasteluvälillä. Tulokset myös indikoivat, että tuotesuunnittelu ja käyttöiän lopun suunnittelu ovat saavuttaneet pientä kasvua tarkasteluajanjaksolla, mutta ne ovat silti edelleen varsin marginaalisia raportointiaiheita. Logistiikka puolestaan ei nouse esiin raportoitavana teemana tai konseptina tuloksissa, mitä voidaan pitää mielenkiintoisena ja merkittävänä löydöksenä. Tutkimuksen tulokset vahvistavat aikaisempien tutkimusten tuloksia siitä, että ympäristöllisten seikkojen raportoinnilla on dominoiva asema sellu- ja paperiteollisuuden vastuullisuusraporteissa. Tulokset myös indikoivat, että sosiaalisista aiheista raportointi on edelleen pienessä roolissa, eikä se näytä juurikaan kasvaneen tarkasteluajanjakson aikana.

Tutkimuksen mukaan vastuullisuusraportoinnissa olisi hyvä pyrkiä tulevaisuudessa raportoimaan kattavammin tuotesuunnittelun, käyttöiän lopun ja erityisesti logistiikan osalta. Myös sosiaalisen ulottuvuuden kattavammalle raportoinnille näyttäisi olevan tarvetta. Koko toimitusketjun läpi ulottuva raportointi sekä kestävyuden monien ulottuvuuksien parempi huomioiminen tarjoaisivat mahdollisuuden tarkastella vastuullisuutta kattavammin yli organisaatio-rajojen.

Avainsanat	vastuullisuusraportointi, vastuullinen toimitusketju, sisällönanalyysi, Leximancer, sellu- ja paperiteollisuus
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**UNIVERSITY
OF TURKU**

Turku School of
Economics

SUSTAINABILITY REPORTING IN THE PULP AND PAPER INDUSTRY

A supply chain perspective

Master's Thesis
in Supply Chain Management

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1	INTRODUCTION.....	12
	1.1 Background	12
	1.2 Research objective and structure of the thesis	13
	1.3 Key concepts	14
	1.3.1 Supply chain.....	14
	1.3.2 Supply chain management	14
	1.3.3 Sustainability.....	15
	1.3.4 Corporate social responsibility.....	15
	1.3.5 Sustainability reporting.....	16
2	SUSTAINABLE SUPPLY CHAIN MANAGEMENT	17
	2.1 Concept of sustainable supply chain	17
	2.2 Sustainable supply chain framework.....	21
	2.3 Product design.....	22
	2.4 Sourcing	24
	2.5 Production	26
	2.6 Distribution.....	27
	2.6.1 Warehouses	28
	2.6.2 Transportation	29
	2.7 End-of-Life.....	32
	2.7.1 Disposal.....	32
	2.7.2 Reverse material flows.....	32
3	SUSTAINABILITY REPORTING	36
	3.1 Theoretical implications of sustainability reporting.....	36
	3.2 State of sustainability reporting	38
	3.3 Criticisms towards sustainability reporting.....	41
	3.4 Motivators of sustainability reporting	42
	3.5 Reporting on sustainable supply chains.....	43

4	PULP AND PAPER INDUSTRY	45
4.1	Industry overview	45
4.2	Pulp and paper supply chains.....	46
4.3	Sustainability in pulp and paper industry.....	48
4.4	Sustainability reporting in the pulp and paper industry	52
5	METHODS AND MATERIALS	54
5.1	Materials	54
5.2	Method	57
5.3	Research process	60
6	RESULTS	64
6.1	Concept map 2010-2019	64
6.2	Concept map 2010.....	66
6.3	Concept map 2014.....	69
6.4	Concept map 2019.....	72
7	DISCUSSION	76
7.1	Themes of the sustainability reports	76
7.2	Reporting through SSCM framework	77
7.3	Development of sustainability reporting in pulp and paper sector	80
7.4	Evaluation of the study.....	82
8	CONCLUSIONS AND FURTHER RESEARCH.....	84
	REFERENCES.....	87

LIST OF FIGURES

Figure 1. SSCM framework based on the models of Hassini et al. (2012) and World Economic Forum (2015)	22
Figure 2. Timeline of GRI Guidelines and GRI Standards	40
Figure 3. The steps of the research process.....	61
Figure 4. The Leximancer analysis model	62
Figure 5. Concept map of the years 2010-2019.	65
Figure 6. Synopsis chart 2010-2019.....	66
Figure 7. Concept map 2010.	67
Figure 8. Synopsis chart 2010.....	68
Figure 9. Concept map 2014.	70
Figure 10. Synopsis chart 2014.....	71
Figure 11. Concept map 2019.	73
Figure 12. Synopsis chart 2019.....	74

LIST OF TABLES

Table 1. The companies of the data	55
Table 2. Concepts related to supply chain functions.....	78

1 INTRODUCTION

1.1 Background

Recently, there has been a growing interest in sustainability in supply chains. Sustainability has become a common interest of both consumers and stakeholders in the organizational level. Globalization development has made corporate social responsibility (CSR) more important for supply chain management (Feng, Zhu and Lai 2017, 297). The legislation and the attitude climate towards ethical issues can vary a lot between developed countries and developing countries. There has been many public exposés of horrible working conditions and environmental contamination of big global companies causing reputation damages. The sustainability and environmental issues figure more and more prominently in different medias. Especially after the release of the IPCC (Intergovernmental Panel on Climate Change) report on August 2019, the news about environment and global warming have been making headlines regularly. The IPCC report presented facts on how irresponsibly the humankind is using the planet's natural resources. The report emphasized that the nations cannot focus solely on traffic and industrial emissions, when formulating their carbon reduction goals and related actions. The report emphasized the need to widen the scope also towards food chains and land use. (Yle 2019). It pointed out the effects of forest use. Main concern is that the forests as carbon sink areas are vanishing and fertile soils will be impoverished. It is estimated that forests contain approximately 45% of the global stock of carbon (the Royal Society 2001, 7). Carbon sinks are crucial part of achieving carbon neutrality goals, like EU's aim to be climate-neutral by 2050 (European Commission 2020).

The manufacturing sector produces massive amounts of pollution and waste during the manufacturing processes. Consumers, investors and other stakeholders are starting to become more conscious about the negative externalities companies are responsible for. Hence, these days majority of the biggest companies are communicating about their responsibilities to the stakeholders through sustainability reports. The pulp and paper sector, being one of the industries with great environmental impacts (Bergquist and Söderholm 2018, 65), are pioneers in producing environmental reports. For example UPM, a Finnish pulp and paper company, has produced environmental reports annually since 1996. This sector provides examples of sustainability reporting practices over a decade

of time and has history of greening the forest industry with new technology (Berquist and Söderholm 2018, 67).

Analyzing of the content of sustainability reports has been a popular subject in the research field of accounting and business strategy (Torelli, Balluchi and Furlotti 2020, 470; Landrum and Ohsowski 2018; 132), however less addressed in the supply chain management studies. The concept of sustainability reporting is still relatively young, and the guidelines and standards are still changing and developing to be more consistent and comparable with the content (UN 2017, 27). The right way to report still remains unclear. Consequently, further studies are needed to determine an established practice for supply chain sustainability reporting.

1.2 Research objective and structure of the thesis

The aim of this study is to create knowledge about sustainability reporting of the European pulp and paper industry. The study focuses particularly on supply chain related information with the objective to provide tangible recommendations for future reporting practices. This study is carried out by reviewing sustainability reporting of large pulp and paper industry companies from a supply chain point of view. Reports of the 10 biggest pulp and paper companies in Europe are examined. The study is qualitative by nature and the reports are analyzed by means of content analysis.

The study has two main research objectives: 1) to identify themes appearing in the sustainability reports and 2) to evaluate the development of the sustainability reporting. These objectives were chosen to gain better understanding of the content of the sustainability reports and to be able to track changes through the time. The study is framed to focus on European pulp and paper companies. The framing was done because European companies have been known to be forerunners in the sustainability reporting in pulp and paper industry.

This thesis is divided into seven chapters. The structure of thesis is organized as follows: Chapter one introduces the research topic, the research objectives and key concepts for the reader. Chapters two, three and four present an overview over the existing literature. Chapter 2 concentrates on sustainable supply chains. Chapter three examines the sustainability reporting and sustainability reporting on supply chains. Chapter four focus on giving an overview of the pulp and paper industry and presenting the field-specific sustainability issues. Chapter five explains the choice of research method and the steps of

the research process. Chapter six analyzes the results of the study. Conclusions are made in chapter seven.

1.3 Key concepts

1.3.1 Supply chain

According to Handfield and Nichols (1999, 2): *“The supply chain encompasses all activities associated with the flow and transformation of goods from raw materials stage (extraction), through to the end users, as well as the associated information flows. “ Their definition recognizes value adding material flows and related information flows as the main components of supply chains. Ayers (2006, 5) further supplements the concept with financial and knowledge flows and the need to satisfy end-user requirements: “Product life cycle processes comprising physical, information, financial and knowledge flows whose purpose is to satisfy end-user requirements with physical products and services from multiple, linked suppliers.” (Ayers 2006, 5).*

There are several processes that form the supply chain including: designing, sourcing, manufacturing, transporting and retailing physical products or services. Supply chains should be viewed from the perspective of consisting the whole product life cycle, and it highlights also the importance of product support after the sale. The supply chain consists of four types of flows, which are all equally important. Services should also not be forgotten, they also have supply chains and can benefit from the same concepts as product manufactures. (Ayers 2006, 5-6.) This study follows the definition of Handfield and Nichols.

1.3.2 Supply chain management

Probably one of the most popular definitions to supply chain management (SCM) is provided by the Council of Supply Chain Management Professional (CSCMP):

“Supply Chain Management encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and all logistics management activities. Importantly, it also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third-party service providers, and customers. In essence, supply chain management integrates supply and demand management within and across companies. “ (Supply chain management Terms and Glossary 2013)

Handfield and Nichols (1999, 2) define SCM as the integration of supply chain activities through improved supply chain relationships for achieving sustainable competitive advantage. While two definitions of the term supply chain management have been suggested, this study will use the definition suggested by CSCMP (2013).

1.3.3 Sustainability

Sustainable development is most commonly defined as “ a development that meets the needs of present without compromising the ability of future generations to meet their own needs” (WCED 1987,). There are three dimensions of sustainability – environmental, societal and economic (Krajnc and Glavic 2005, 551). Markley and Davis (2007, 764) consider sustainable organization as an organization that while pursuing profit, is also educated to take care of protecting the environment and uphold the rights of workers and other stakeholders as well. In this study sustainability is comprehend as corporate sustainability (CS) and the sustainability concerns all the three dimensions. Van Marrewijk (2003) remarks that there are hundreds of concepts and definitions of corporate sustainability that are referring to a more humane, more ethical, more transparent way of doing business.

1.3.4 Corporate social responsibility

Sustainability and corporate social responsibility (CSR) are two concepts that refer to almost the same thing. Some even consider them as synonyms. Both CS and CSR are used in the management literature to refer to environmental and social management issues (Montiel 2008, 245). European Commission defines corporate social responsibility as “the responsibility of enterprises for their impacts on society”. And it also states that “to fully meet their corporate social responsibility, enterprises should have in place a process to integrate social, environmental, ethical, human rights and consumer concerns into their business operations and core strategy”. (European Commission 2011, 6). Van Marrewijk (2003, 101) asserts that EU expresses CSR as a business contribution to sustainable development. Van Marrewijk (2003, 102) also argues that small but essential distinction between corporate sustainability (CS) and corporate social responsibility is that CSR associates with the communion aspect of organizations and people. CS on the other hand associates with agency principle. In this study, the two terms are used as synonyms.

1.3.5 Sustainability reporting

In general, the terms sustainability reporting has been defined as a voluntary activity oriented at providing account of the societal and environmental implications of doing business to external stakeholders (Kolk 2008,11-12). Nowadays, there is transformation towards mandatory direction. EU for example implemented the Non-financial Reporting directive for large firms in 2018. Sustainability reporting is an important channel to organizations to try to meet the demands of diverse set of stakeholders pursuing different economic, environmental, and social interests to determine the success of the organization (Hahn and Kühnen 2013, 5). Hahn and Kühnen (2013, 7) separate reporting related to Sustainability into three different forms, which are integrated reports; specialized sustainability, CSR or corporate citizenship etc. reports and isolated environmental or social reports. Hahn and Kühnen (2013, 7) regard only the reports that include all three dimensions (economic, environmental and social) of sustainability as truly “sustainability reporting” and they count the one-dimensional reports as sustainability-related reports because they only cover isolated aspects of sustainability. Similarly, in this study the sustainability reports are seen as reports that deal with both environmental and social dimension of the information.

2 SUSTAINABLE SUPPLY CHAIN MANAGEMENT

This section reviews the concept of sustainable supply chain, sustainable supply chain framework and in more detail the different functions that form the sustainable supply chain. First the section 2.1 reviews the literature related to sustainable supply chains and strives to define the concept of sustainable supply chain management. Secondly the chapter 2.2 creates a framework of sustainable supply chain management based on the field literature. Thirdly chapters from 2.3 to 2.7 provide more insights in the different functions of the framework.

2.1 Concept of sustainable supply chain

At a supply chain level, the focus is not only on the focal firm but also on the other links of the supply chain, i.e., the suppliers in the upstream and the distributors and wholesalers in the downstream of the chain. Nowadays business is global. Firms are seeking to reduce costs and to increase strategic flexibility by outsourcing many activities, which has caused a movement of production to the developing economies (Millington 2009, 363). This type of development has resulted in devolution of legal obligations in social and environmental impacts to suppliers, usually located in countries with weak regulation. Globalization has also made distribution channels of goods and services very complex (Dubey, Gunasekaran, Papadopoulos, Childe, Shibin and Wamba 2017, 1119). Therefore, the corporate social responsibility (CSR) is increasingly concerned with global supply chain management and questions about the boundaries of CSR in the supply chain have been raised (Millington 2009, 377). This shows a need to be explicit about what is meant by the term sustainable supply chain.

Sustainability as a term increasingly refers to an integration of environmental, social, and economic responsibilities (Carter and Rogers 2008, 361). However, according to Carter and Rogers (2008, 361) the term sustainability has been inconsistently defined, and also applied rather ambiguously in the existing research literature. The sustainability in supply chain management has in the literature been many times discussed through the term of green supply chain management. The environmental aspect of sustainability has lately been a popular object of supply chain management research. Srivastava (2007, 55) defines green supply chain management (GSCM) as “*integrating environmental thinking into supply chain management, including product design, material sourcing and selection, manufacturing processes, delivery of the final product to the consumers as well*

as end-of-life management of the product after its useful life.” Ahi and Searcy (2013, 334) describe sustainable supply chain management (SSCM) as an extension of green supply chain management. According to them the only difference between the two concepts is that GSCM does not explicitly include the social factors. They also found that overall, the definitions for GSCM were more narrowly focused than for SSCM. Martins and Pato (2019, 997) conclude that maturing of SSCM research has led to more highlighted importance of the social dimension of supply chain management. It seems that the meanings of these two terms are slightly overlapping, but SSCM as the broader definitions has achieved stronger positions in the literature.

In addition, there are multiple definitions of SSCM. Carter and Rogers (2008, 368) define sustainable supply chain management more broadly, including the triple bottom line idea and four supporting facets – transparency, risk management, strategy, and culture: *“we define SSCM as the strategic, transparent integration and achievement of an organization’s social, environmental, and economic goals in the systemic coordination of key interorganizational business processes for improving the long-term economic performance of the individual company and its supply chains.”* Carter and Easton (2011, 47) convey how social and environmental conceptualization and management issues have developed from the “standalone” to the concept of social responsibility and finally to sustainability. In sustainable supply chain management, the intent is to implement best practices comprehensively, across business boundaries, all the way from product conception to the stage of end-of-life recycling.

The development of operation’s and supply chain’s management as a field has been established in the literature. Kleindorfer et al. (2005) examined the development of operation’s management research and note that the main innovations of 1980s and 1990s were total quality management (TQM), just-in-time operations (JIT) and business process reengineering (BPR), which were all focused on improving the profits. In 2000s the supply-chain-focused trends intrigued similar trends at the corporate level. Companies went from lean operations to lean enterprises and then to the lean consumption. In 2010s the sustainable operations management started trending. From the sustainability perspective, the lean operations permeate the entire life of the product containing management of product recovery and reverse flows. Overall, the study highlights the strong supply chain focus since 2000s and sustainability aspect trending in the operations management research in the 2010s.

The existing literature has investigated the development of the SSCM. According to Rao and Holt (2005), in the early development state the field of sustainable supply chains tended to focus on studies of a single function or activity instead of looking at the entire chain. In the same way, Pagell and Wu (2009, 37) note that the environmental focus on the research has been strong. Kleindorfer, Singhal and Van Wassenhove (2005, 490) even claimed that the studies and the literature as a whole have ignored the social component of sustainability in operations management field. Also, Seuring and Müller (2008, 1699) are noticing that the green/environmental issues have been dominating the field of sustainable supply chain when analyzing published papers from 1994 to 2007. In the literature review they also found that social aspects and the integration of the three dimensions are rare. Quarshie et al. (2016, 88) found in their study that SCM journals had published in between 2007 and 2013 much more articles focusing on environmental impacts and issues in SSCM than business ethics (ET) journals. And on the other hand, social impacts and issues were more covered in SSCM articles published in ET journals than SCM journals.

Yawar and Seuring (2015, 637) studied the management of social issues in supply chain by reviewing the literature of CSR and supply chain management. For many years, this phenomenon was surprisingly neglected by the researchers. They discovered that management of social issues in supply chain has rapidly started to gain importance among researchers. Yawar and Seuring point out that there has been strong emphasis on Western perspective in the studies so far in the field of management of social issues in supply chain. This situation is conflicting with fact there are more social issues in the developing countries but efforts to explore the perception of the suppliers from those countries are rare. The findings of Yawar and Seuring also implicate that organizations are more concerned about social issues that have immediate effect on their performance and are more likely to overlook societal issues that might have damaging effects on society in the long run.

A number of studies have investigated the inducements that drive companies to develop their supply chains sustainability. Seuring and Müller (2008, 1706) display external triggers that come to the focal companies from customers, stakeholders or governing agencies. The caused pressure or incentives might lead to more sustainable action by focal companies. They present two strategies for companies. The first strategy is called “supplier management for risks and performance”. Companies following such strategy, have

a fear of losing reputation if sustainability related problems are raised. This view is supported by Hofmann et al. (2014, 168) who write that supply chain sustainability risk is a sustainability-related risk, where condition or a potentially occurring event, that can cost harmful stakeholder reactions, is present within a focal firm's supply chain. This means that the focal company takes up additional environmental and social criteria to complement the economically based supplier evaluation. As Krause et al. (2009, 18) states: "*a company is no more sustainable than its supply chain – that is, a company is no more sustainable than the suppliers that are selected and retained by the company*". A broader perspective to a stakeholder collaboration has been adopted by Pagell and Wu (2009, 54) who claim that firms that are more successful in sustainability seek out new type of partners to bring new knowledge and opportunities into the chain. The second strategy that Seuring and Müller (2008) present is called "supply chain management for sustainable products". It is usually based on life-cycle standards for the social and environmental performance of products, which are implemented throughout the supply chain. Similarly, Wolf (2011, 229) discusses the pressures that come from the stakeholders and emphasizes the importance of understanding the expectations of multiple external stakeholder groups opposed to only focusing to mere understanding of customer expectations. This wider outlook on the stakeholder expectations have been linked to the ability to develop more sustainable supply chains. Pagell and Shevchenko (2014, 46) highlight that supply chains often have to satisfy the needs and demands of their stakeholders, and some of them, such as governments, NGOs and communities, are not interested about the economic performance of the chain. Usually, those stakeholders are more focused on the chain's impact on environment and society.

The stakeholder needs or pressures are not the only triggers for firms to focus on SSCM. Improvement in social and environmental responsibility can lead in greater firm performance economically. Golicic and Smith (2013, 91) found evidence that firms will obtain positive financial results from making environmental supply chain efforts. This can include eliminating waste, using resources more efficiently, improving working conditions or contributing to communities. Elkington (1998) calls this the triple-bottom line, improving the social, environmental and economic performance.

There has been also critic towards the SSCM research. Pagell and Wu (2009, 37) argue that much of the existing literature has focused on a single function or activity and posit a different task/behavior/investment as the key to being sustainable. Whereas, Pagell and Shevchenko (2014, 45) criticize that the supply chain management field is studying

how to manage unsustainable supply chains in a more sustainable manner instead of managing truly sustainable supply chains.

2.2 Sustainable supply chain framework

As noted above, firms encounter external pressures about sustainability from different stakeholders and this creates a need to reconfigure what is a sustainable supply chain that combines economic prosperity, environmental quality and social equity. This kind of sustainable practices will have an impact on all operations and the supply chain management. It will modify product design, sourcing, production, transportation models, stock policies, distribution and waste handling along with partners' relationships (Fabbe-Costes, Rousat, Taylor and Taylor 2014, 666). Firms are encouraged by the sustainable development agenda to take a wider view of their supply base, design or redesign their supply chains to encompass activities along the entire chain (Fabbe-Costes et al. 2014, 665; Seuring and Müller 2008,). The more sustainable practices should also aim at optimizing the sustainability of the complete chain due to the total cost and maximum value creation instead of sub-optimization at the firm level.

Hassini, Surti and Searcy (2012, 69; 73) reviewed sustainable supply chain literature between years 2000-2010 and based on that provided a framework for sustainable supply chain management. The framework consists of six relevant functions within the chain: sourcing, transformation, delivery, value proposition, customers, and recycling. Quite similarly World Economic Forum's (2015, 11) report *Beyond Supply Chains*, maps the landscape of responsible supply chain practices. The framework consists of product design, sourcing, manufacturing, distribution and end-of-life functions, and also two cross-functional practices: labour standards and technologies.

In this study the SSCM framework, and the themes of SSCM are viewed from the perspective of functions in a supply chain. The SSCM framework of this study combines the Hassini, Surti and Searcy framework together with World Economic Forum's landscape of responsible supply chain practices. Functions of the sustainable supply chain framework are product design, procurement, production, distribution and waste management. These functions will be covered in the next chapters. There are also two cross functional practices technologies and labour standards, which are needed to take in consideration in the sustainable supply chains.

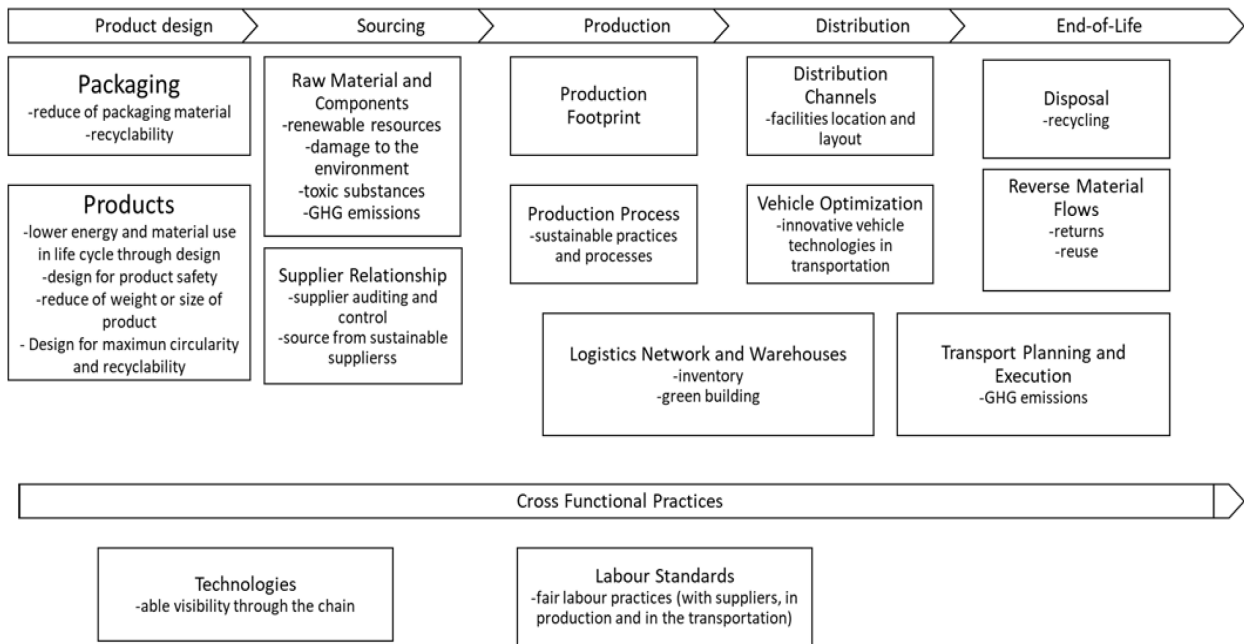


Figure 1. SSCM framework based on the models of Hassini et al. (2012) and World Economic Forum (2015)

2.3 Product design

Typically, the main focus of product design, production and packaging operations has been to reduce cost while meeting product specifications, pricing strategies and customer needs. Also, adherence to safety, health and environmental legislation needs to be maintained. Lack of awareness about energy and chemicals used, the amount of natural resources, the amount of pollution being discharged or harmful health effects to workers has been common in the past. (Grant, Trautrim and Wong 2017, 119).

Redesigning of products and processes to prevent pollution has been proven to have connection to improved plant performance (Klassen and Whybark 1999, 613; Pagell and Wu 2009, 40). Handfield (2001) argued that most designers do not consider sustainability in the designing state due to the incentive structures. Pagell and Wu (2009, 40) claim that proactive top management which understands that sustainability needs to be an organizational commitment, is connected to redesigning products and/or processes that are more sustainable. Similarly, Dubey et al. (2017, 1127) have stated that the role of green product design is important in SSCM. They emphasize the importance of continuous improvement, and the information needed for this purpose that can be provided by appropriate information technologies. Fabbe-Costes et al. (2014, 666) propose that proactive orientation towards sustainability in organization is associated with the development of product

design with the abilities to use design-for-the-environment principles and life cycle analysis.

Sustainably designed product is designed for lower energy and material use in life cycle (Raja Ghazilla, Sakundarini, Taha, Abdul-Rashid & Yusoff 2015, 332). Design for environment (DfE), is becoming a main concern among industrial designers. They are now realizing that 80 % of the products environmental impact is determined at the design phase (Tischner & Charter 2001, 120). Design for environment can be succeeded by looking into materials. Avoiding the use of hazardous materials will have positive influence on consumer's health. Better design can minimize water and carbon footprints, lead to cleaner production, make consumption more sustainable and design for circular economy. Life cycle assessment of many consumer goods shows that a significant proportion of emissions can come from the consumer's use of products, so also making the product more energy efficient is matter that should be noticed. More sustainable design can be achieved for example by reducing the weight or the size of product, maximum recyclability and circularity of the material. However, as Raja Ghazilla et al. (2015, 431) bring out, opportunities associated with implementation of DfE have not been fully understood. Designers are integrating environmental aspects into their designs more due to regulatory requirements than for proactive the pursuit of decreasing environmental strain and creation of competitive edge.

The traditional function of packaging is to protect the product to avoid generating losses along the supply chain to the consumer (García-Arca & Prado-Prado 2014, 327). Dekker et al. (2012, 674) highlight that according to some reports packaging materials represent up to 23% of the total weight of waste globally. Packaging has a remarkable impact on fabricating waste material. Sustainable packaging of course means utilizing recycled packaging materials from renewable materials but it also means the use of safe materials that are healthy for individuals and, constructed using clean production. In addition, sustainable packaging has a minimal impact on the environment throughout its life-cycle and it is designed to optimize materials and energy use (Wilson 2018, 11). On top of that it meets the market criteria for the performance, it is competitive also cost-wise. Tangibly it can mean reducing weight or size of the packaging or designing for maximum recyclability and "circularity". It is important to minimize the ratio of packaging material to product volume. For increasing future recycling volume one solution can be labelling plastic parts, so consumers would know better how to recycle the packaging. Reuse of the material naturally causes redistribution flows back to the manufacturer but

on the other hand it does cut down the need of raw material in packaging (Dekker et al. 2012, 674).

2.4 Sourcing

Consumers hold companies accountable for their entire supply chain, irrelevant of how distant a supplier might be to a brand. The final overall impact of the supply chain evaluates the sustainability performance. The inclusion of sustainability issues into the procurement strategy and sourcing decisions is the aim of the sustainable procurement (Grant, Trautrimis and Wong 2017, 158). Sustainability is not limited to the environmental dimension. It addresses the all three parts of the triple-bottom-line. Grant et al. (2017, 158) claims that ethical perspective has been receiving an increasing attention recently. Social injustice or violation of human rights brings out two types of consumer reactions: avoidance of violating brands and retailers, or support of socially conscious ones (Rindell, Stranvik and Wilén 2014, 114; Rizkallah 2012, 342). Beside consumer reactions also legislation aims to make businesses behave more responsibly. For example, areas like bribery and corruption are covered by legislation.

Grant et al. (2017, 159) proposes that based on stakeholder theory, procurement is considered as a key function for making supply chains more socially responsible and greener. This view stems from the idea that in many cases – buyers have the upper-hand position in the supply chain, and they can consequently lead a supply chain toward higher degree sustainability.

Emmet and Sood (2010, 63) suggest that from an environmental point of view there are few additional factors to be emphasized in the procurement practices. First, the effect the procured material will have on the footprints of the upstream and downstream chains should be evaluated. Secondly, investigation of recycled material substitutes that could offer more sustainable “second source alternative”. Thirdly, environmental issues need to be taking into account, when evaluating and assessing the suppliers (Varnäs, Balfors and Faith-Ell 2009). Previous studies have also explored the different social dimensions sustainability in supply chains including the purchasing activities from suppliers. Mani et al. (2016, 270-271) found six dimensions of supply chain social sustainability and they all applied to suppliers, as criteria to take into account. Those dimensions were: equity, safety, health and welfare, philanthropy, ethics and human rights.

Pagell and Wu (2009, 39) state that there are two best practices in sustainable purchasing that have received significant attention: collaboration and certification. Collaboration means collaborative behavior with suppliers and customers. There needs to be incentives to reduce suppliers' risk from engaging in collaborative processes expected by sustainability (Goodman 2000, 210). Firms also need to educate their suppliers and make their suppliers educate each other (Rao and Holt 2005, 901). In the past literature supplier certifications have also received attention. It is one of the few areas that addresses social issues like unsafe working conditions and child labor in the literature of the sustainable supply chain management (Teuscher, Gruninger and Ferdinand 2006, 7; Pagell and Wu 2009, 39).

Emmett (2010, 64) presents a Green Procurement framework, which combines pollution prevention, life cycle perspective and resource efficiency. Pollution prevention means that instead of managing pollution and waste after they have already been created there would be processes and practices to prevent the creation of the pollution and waste. Life cycle perspective suggest evaluation of product's environmental impact over its lifetime, including raw material extraction, manufacturing, packaging, transport, energy consumption, maintenance and disposal. Resource efficiency includes preferring recycled materials and reusable content over virgin materials and also conserving energy and water.

Understanding over how sustainability of an offered product or service can be judged, is essential in in the selection and comparison process of suppliers. Sustainability labels and certifications can be used for evaluating the supplier performance. Certifications are given by external organizations. Certification can be achieved by following certain standards set by the awarding organization. An external auditor has the burden of monitoring and auditing the supplier. The downside of the certifications is that they usually focus on a particular aspect, instead of the overall sustainability of the product or service. (Grant et al. 2017,167).

Quantifying the advantage of sustainability of one supplier over another is hard. Evaluating the value of improvements is even more difficult. While purchaser is comparing purchasing options, the sustainability performance can be set as a knock-out criterion (Winter and Lasch 2016, 183). For example, only considering suppliers achieving a particular certification. Other option is to measure monetary values and compare or form part of the decision in a multi-criteria analysis (Grant et al. 174). Implementing sustainability into procurement becomes immensely difficult when more sustainable products are more

expensive and if the sustainability achievements are challenging to measure in a monetary value.

2.5 Production

More and more companies around the world are trying address the issues of environmental protection and mitigation of impacts caused by human activities. The problem is that the purpose of commercial activity is the creation of revenue from the satisfaction of consumer demand and increase the product's value. According to Blok et al. (2015, 19) we have undermined the resource base in which the whole industrial system relies. The new challenge is to integrate sustainable development into the value chain of a product. Aiming at green product manufacturing can reduce the burden on the environment (Tsai and Lai 2018, 4). Thus, the main goal of greener production is to produce goods and provide services, while taking into account the environment, nature and the people living in it.

The United Nations Environmental Program (UNEP 2021) defines cleaner production as follows: "*Cleaner Production is the continuous application of an integrated preventive environmental strategy applied to processes, products, and services to increase eco-efficiency and reduce risks to humans and the environment.*"

Drake and Spinler (2013, 695-696) point out that the adoption of cleaner technologies has already helped to avoid doomsday predictions of Malthus (1798), but in future similar efficiency gains needs to be reached with the reduction of toxic emissions. Hassini, Surti and Searchy (2012, 71) conclude that, according to literature, companies adopting lean manufacturing strategies are more likely to adopt sustainability practices.

Cleaner production tries to redeem the efficient use of energy and water consumption and raw materials and prevent harmful pollution during the production processes and the delivery of the product or services to customers (Chien & Shih 2007, 385; Baines et al. 2012, 57). Organization strategy should focus on profitability through using environmentally friendly operating processes. When investing in production technologies Drake and Spinler (2013, 696) point out pollution intensity (the amount of waste emitted per unit of production) as a focal dimension relating to environmental performance. Matters that need to be taking in consideration in cleaner production are minimizing the consumption of raw materials, and also the use of energy. Energy consumption should be sustainable. It is preferable to use renewable energy in the manufacturing process. The reuse of the

product and/ or parts in the production process can make the process more environmentally sustainable. Reducing waste of the production can also have a big impact as well as recycling the waste.

Optimizing the production process should combine the environmental dimension being part of the design of the production process, together with quality and cost. Jayal et al. (2010, 147) proposes six elements that can be used to rate the sustainability of machining in manufacturing process. Those basic elements are: environmental friendliness, energy consumption, machining cost, waste reduction, operational safety and personnel health. Reduced energy and water use can do both improve the efficiency in the use of resources and make the production process more environmental but also cut down the production costs and make it more economically profitable.

It has come more and more common to track the production carbon footprint of the company's production. Tracking the carbon footprint able that the organizations can measure the environmental and social impact of the products they produce (Emmett & Sood 2010, 106). The tracked numbers give the organizations information on their development in the sustainability issues.

Having sustainable production process means, that company has to also consider the social sustainability aspect of the production. According to Mani et al. (2016, 271) measures needed to take in account in manufacturing are gender equality, workplace diversity, employee's safety and health, fair wages, philanthropy, human rights and ethical issues. Promoting decent work and fair labour practices is part of those actions.

According to Hassini, Surti and Searchy (2012, 71) SSCM research has focused mainly on manufacturing sector and it can be explained by two factors. Firstly, traditional operations research has focused on manufacturing and production topics, so it is natural that SSC research builds on that literature the same way. Secondly, environmental regulations have historically focused on manufacturing plants so there is also a pushing mechanism there.

2.6 Distribution

Distribution combines transportation with warehousing, i.e., it is about delivering the right goods to the right place at the right time and at right cost. The term logistics is also

used to describe function of managing the movement of goods through supply chain. Dubey et al. (2017, 1127) classifies logistics and warehousing operations as potential subjects of improvement for enabling organizations and supply chains becoming more environmentally friendly. Tacken and Sanchez Rodrigues (2014, 79) argue that logistics and ecology do not contradict each other. Companies need to consider both aspects in their long-term planning. The environmental side of sustainability can be affected by green distribution which includes all activities to reduce or eliminate damages for the environment and waste during shipment (Cankaya and Sezen 2019, 101). According to Lin et al. (2014, 1118) in green logistics the traditional objective of distribution management has been upgraded from solely cost orientation to minimizing system-wide costs related to economic and environmental issues. Sarkis (2003, 399) argues that decisions like distribution outlet locations, mode of transportation used, control systems and lead time strategies will affect the green supply chain through the forward and reverse logistic networks. Hassini, Surti and Searcy (2012, 73) are also highlighting the distribution network locations and discuss in their study about sustainable delivery function and how the choice of location either close to the customer, vs. close to the raw material source can have big impact on the GHG emissions. Kumar (2015, 376) is more concerned with characteristics affecting the green performance, which are the fuel consumed in distribution by the vehicle transporting the product, distance to the customers, frequency of the transportation operations and packaging characteristics.

2.6.1 Warehouses

Dudey et al. (2017, 1120) point out that warehouses generate lot of the packaging waste in the supply chain. Hence, there is potential for waste elimination and cost reductions at this stage of supply chains. Dubey et al. (2017, 1120) stress the importance of recycling facilities at the warehouse. Smart and green building deployments are also important in greening the warehousing. When building new warehouses, the Green Building principles should be followed. Also, existing warehouses can be modified to become greener by incorporating some of the same principles. It is also important to pay attention to efficient use of energy on daily basis in warehouses. Accurate forecasting of demand can help to keep the inventory levels lower as well as fixed to known supply lead times by improving planning and remove uncertainty. Hassini et al. (2012, 73) argues that there is a lack investigating in the field sustainable practices in the choice of inventory management pol-

icy. Most of the decision making frameworks used, do not incorporate sustainability criteria at all. Dubey et al. (2017, 1120) also propose that high utilization, storage minimization and retrieval cost are important objectives that should be acknowledged. They also identify green warehousing as one of the main drivers of SSCM.

Grant et al. (2017, 110) point out that there is also the social dimension of sustainability in warehousing that should be considered. Developing technology and increased complexity of the supply chains means that warehouse operators require new skill sets and knowledge. Health and safety issues should also be considered in the warehouse and workplace design. A new challenge of demographic change to older societies in developed countries is adding more importance for the ergonomic workplace design and well-being especially in jobs that are physically burdening.

2.6.2 Transportation

Freight transportation is causing most of the logistic activities' carbon emissions (World Economic Forum, 2009) but because their share is smaller than that of manufacturing, there has also been less pressure to reduce transport emissions to date. Now however, governments are signing up for strict goals to cut down transport emissions as well. Other more social issues caused by freight transport include noise, vibrations and accidents. The transport sector is one of the biggest energy users. According to the Energy, transport and environment statistics report by Eurostat from the year 2020, 30,5% of final energy consumption comes from transportation and 80 % of that is consumed by road transport. In 2014 transport caused over 20% of greenhouse gas emissions in Europe and 70% of those come from road transportation (European Commission). There has been some reduction of energy intensity in some transport modes but yet the growth of transport volumes and increase in proportion of road transportation keep the overall carbon emissions of transportation as rising. (Grant et al. 2017 p. 65-67; Achillas et al. 2018 p.75).

Literature offers many transportation planning and execution opportunities to reduce environmental effects. Dubey et al. (2017, 1121) classify logistics optimization as one of the relevant drivers of SSCM. They define logistics optimization as the optimization of the speed, route, load and nature of transport. Similarly, Kumar (2015, 376) mentions optimizing the distribution routes as an action to minimize environmental effects of logistics. When considering the sustainability of logistics operation function, Kohn and Brodin (2008,) are pointing out characteristics of logistic system that can both increase the effectiveness and enhance its environmental performance. Those characteristics are:

consolidation of freight flows, changes in transport mode and decrease of emergency deliveries. Kim and Lee (2012, 242) highlight the importance of considering the environmental aspect in the process design phase of logistics practices. For example, a unit load system and logistics process optimization can decrease the distances between destinations and origins, and that can lead to reduced number of load carries. Ji, Gunasekaran and Yang (2014, 212) on the other recognize joint distribution as way to reduce carbon footprint in the distribution phase. Increasing vehicle utilization degree is supported by Kumar (2015, 376) who addresses minimizing the empty running of containers.

Green practice for greener distribution introduced by Achillas et al. (2018) included the preference and use of non-polluting means of transportation. Especially the use of intermodal transports which combine the train or ship mode with the truck. One example of this are the RORO ships, i.e., ferries designed to carry wheeled cargo. The introduction of containers has made it significantly more efficient to combine different transport modes to intermodal transport due to the single transport load unit. One of the main inefficiencies in transport has been the handling of the goods at transshipment points, but this has become much faster due to containers (Dekker et al. 2012, 673). Reduction of freight transportation is naturally also an option to reduce emissions, for example through local sourcing. There is also a possibility to use cleaner engines and fuels to cut down emissions. The use of more energy efficient transportation can mean hybrid systems that consume natural gas or biofuels, or technologies that reduce fuel consumption. Gasoline has evolved cleaner during the last decades (Dekker 2012, 673). Biofuels can be mixed with standard gasoline, but more extensive use requires adapting the engines. When comparing fuel to electric vehicle and electric power, the electronic vehicles produce very little emissions, but it is crucial that electricity produced is also less pollutant, or even preferably renewable energy. Fuel choice also matter within ships. There has been a trend of restrictions on shipping fuel. Latest shipping fuel regulation aims to cut sulphur levels of the fuel and that way reduce air pollution (The Guardian, 1.1.2020).

In addition to internal factors, there are external factors affecting the transport mode choice. Availability of infrastructure has a great influence on the choice but also the quality of infrastructure effects. Quality of logistic service providers and vehicles and their availability has an impact on the choice (Dekker et al. 2012, 672). Besides those local laws, regulation can also affect the choice. The requirements that customer has towards cost and service impact the selection of transport mode. Longer order cycles and large order size will enable less flexibility in the transport mode like sea freight. And on the

other way around, small order size and need for quick delivery call for highly flexible transport mode like road freight. There are also product characteristics like value and weight that influence the transport mode choice. Generally slower transport modes emit less CO₂ than the faster ones (Dekker et al. 2012, 672).

Transportation is nowadays often outsourced from a third-party logistics service provider. Companies whose core competencies focus on other functions than logistics in many cases outsource their distribution to logistics service providers (LSP) (Piecyk & Björklund 2015, 463). This implies that aims to make transportation more sustainable requires collaboration with the logistics service providers. Piecyk and Björklund (2015, 463) note that sustainability of LSPs is expected to become more important as a supplier selection criterion.

For many years there has been a pressure for logisticians to reduce the delivery time in order to increase the efficiency of the distribution system (Emmett & Sood 2010, 127). But those fast modes of transportation will have their toll on the environment. Thus, a need to train consumers to wait for products so that companies can minimize their environmental impact of their activities by choosing also slower and less contaminating modes of transport, is emerging (Emmett & Sood 2010, 128). A possible challenge for this type of development and education of customers can be, that consumer habits usually change slowly.

Drake and Spinler (2013, 696) recognize the environmental and commercial importance of transportation in supply chain and emphasize the importance and central role that technology choice plays. They point out that transportation technology is usually less capital intensive if compared to production technology and the technology is also better available for purchase. But still the transportation technologies can be constrained by vehicle range and routing. Also, vehicles with improved aerodynamic characteristics are an option. But the limited range of the electric vehicles is a problem outside city transport.

Grant et al. (2017, 67) also notes that there are social dimension related sustainability issues in transportation sector. There has been a drastic change in the transportation workplaces due to the new advances in technology. New technology allows exact and round-the-clock tracing of vehicles and performance monitoring. Even though this type of technology has many advantages on route optimizing and improving of driving, it can also put drivers under a constant pressure and de-skill driver's profession by shifting all re-

sponsibility away from them. Grant also mentions the wage related issues in the transportation sector including low employment security, pressure to work unreasonably long hours and per-delivery pay structure.

2.7 End-of-Life

At the end-of-life point of product, the product will either go to disposal or collection. Who is responsible of the product in the end-of-life point? According to Cai and Choi (2021, 272) during the past decades, the awareness of consumers and environmental legislations are increasingly affecting firms' operations to reduce the waste.

2.7.1 Disposal

It is getting more and more difficult to dispose waste. Landfill fees are increasing because their problematic nature has become to evident. Landfills, without proper containment can pollute the soil, and contaminate ground waters and even create methane. Incinerations are also generally used, they generate energy from the waste, but produce also lots of toxic gases and ashes. Hazardous waste has become extremely difficult to dispose at any cost. Due to the waste management problems, there are large areas of land that are now in uninhabitable condition. Other injurious effects that can be identified as well; water extracted from rivers needs to be filtered for consumption, fish from economically important rivers are unconsumable, and smog caused by traffic and industry is creating severe health issues in urban areas. This is resulting in situation, where organizations must investigate better ways of using the by-products and residuals. Besides waste placement problems, there is also the issue of earth's finite natural and energy resources. With the enormous and growing consumption of these resources, there is a need for reverse logistic systems to help to reduce the use of materials and to reuse the products we have produced and used earlier (Grant et al. 2017, 179-180; Emmett and Sood 2010, 171-174)

2.7.2 Reverse material flows

A decision to recycle or reuse at some step of the supply chain requires reverse material flows. Reverse logistics (RL) is the movement of goods in the reverse order – from destination to origin. It will enable either reprocessing, remanufacturing, repairing, reusing, recycling, disassembling or disposing. Reverse logistics is connected to returning the faulty, used or unwanted product from the customer to the provider. Managing reverse

logistics also means returns prevention, gate keeping, collection and disposal. Reverse logistics plays an important role in contributing resource and waste management. Reverse logistics has spanned to the area of environmental sustainability as well (Huscroft et al. 2013, 305). The remaining value of the product, which use had ended, can be recovered and it also makes it possible to reuse some of the carbon footprint invested in the product when considering the product lifecycle (Dekker & Spinler 2013, 674). Ji et al. (2014, 214) uses a term take-back network for the reverse flow of supply chain returning and remanufacturing solid waste. They also point out the role that the speed of return has for the potential reusability value. Huscroft et al. (2013, 305) also recognize that RL can enable efficiency gains and reduction of costs through potential as market differentiator and profit center.

Huscroft et al. (2013, 319) also examine the environment as one of the key issues in RL. They recognized a direct relationship to regulatory issues. Abiding by mandatory regulations is necessary because otherwise there would be monetary penalties. Nowadays companies are becoming more responsible for the disposition of their products, even if before such products were disposed of at the customer level. There is trend of more strict packaging and disposal legislation (Simpson 2010, 229). This pressure can be already seen as an action too. For example, in EU as part The European Green Deal transition several waste laws will be reviewed with aims to improve waste management, stimulate innovation in recycling and to limit landfilling (European Commission). This has started to drive some industries to look into alternatives instead of just allowing end-of-life products end up in landfills.

Reverse logistics and closed loop supply chains mean changing what the chain has done earlier. When forming a formal reverse flow, the systems will require doing changes in the design, and also in the relationships with other members of the chain (Pagell and Wu 2009, 39). Martins and Pato (2019, 1009) discusses the lack of the social factor in the literature of return process. Reverse logistics and closed-loop supply chain as a supply chain functions represents social aspects less than other functions.

Prevailing mentality has been that manufacturers or retailers are not responsible for recovering their products after delivery to the consumer (Grant et al. 2017, 180). Product owners want to dispose or discard the product after the product is no longer needed, functional or fashionable. At this point, the disposing or discarding of the product doesn't often happen in a responsible manner and many times the product ends up in a landfill, not in circular use. This type of wasting of limited raw materials, could be avoided by

switching to a circular economy model. It creates possibilities to decrease the consumption of the virgin materials, reduce pollution due to the disposal waste and decrease losses of biological nutrients (Grant et al. 2017, 180; Bocken, Short, Rana and Evans 2014, 49-50). Zeng et al. (2017, 56) define that the strategy of circular economy is to find effective ways to maximize the utilization of resources and minimize environmental pollution, while advocating for the integration of clean production. According to Genovese, Acquaye, Figueroa and Koh (2017, 344) circular economy is not only focused on the reduction of the use of the environment, but also on the creation of self-sustaining production systems in which materials are used again and again. From circular economy perspective, supply chain members actions with reverse logistic and recycling systems are crucial to keep products, materials and components at highest utilization and value at all times.

There is certain hierarchy of waste management (Price and Joseph 2000, 98). Not all options are equally good. For example, energy recovery should be the last option for disposal. Highest in the hierarchy is reducing of materials, secondly comes reuse of materials, thirdly recycling of materials and lastly recovery of energy. Reduce involves less use of natural resources. There can be use of alternative, more resource efficient materials or possible less packaging material. Also, consumer behavior can have an impact on reducing material use. The core idea is that the fewer natural resources is consumed the less waste is also created. Reuse means process where product is used from the beginning in the same or similar purpose for which it was originally manufactured, using its original shape. Besides reusing the product as it stands, product can also be repaired or reformed. Also, dismantling and re-use of individual components or parts can be considered, if it is not possible to reuse the whole product. The problem with reuse is the relatively high cost of manual dismantling of a product.

Recycling means the recovery of the materials of the product. Reuse can be difficult to implement for example in fields that experience rapid technological evolution. In such case recycling can be a more suitable option because the needed materials might stay relatively similar. Recycling is an option that requires reprocessing, so it usually also consumes energy, however, it reduces the use of natural or virgin resources. Recovery usually means the incineration of waste and it normally means creation of energy in the form of heat or electricity. This should be to option when the recovered materials cannot be reused or recycled. (Grant et al. 2017, 183).

Recycling and reverse logistics are crucial for maintaining a healthy environment. They are important because of the harmful effects of placing end-of-life products into

landfills and the scarcity of natural resources. Importantly, they will help the shift towards a circular economy because they increase the utilization of products, components and materials. In recent years there has been increasing regulatory pressure towards more strict waste legislation. That has started to drive some industries to look into alternatives to just allowing end-of-life products end up in landfills. Increasing number of companies are building the reverse logistics infrastructure and practices needed to reduce, reuse, recycle and recover products. A few companies have demonstrated that it is possible to have a truly closed-loop supply chain. The growing pressure will probably drive regulation toward extended producer responsibility, which would mean more investments in reverse logistic and recycling. It would also most likely effect on consumer's purchasing and recycling habits if they will have to pay for reverse logistic and recycling of the product, they want to get rid of.

3 SUSTAINABILITY REPORTING

There is a growing pressure for companies to communicate more transparently to their stakeholders. Customers are becoming more aware of the environmental and social sustainability problems and expect more social responsibility information from the firms. They demand for from the firm safe, high-quality and environmentally friendly products with less harmful manufacturing processes for the environment and the communities (Zadek 2004; Tate ym. 2010, 20).

Corporate social responsibility (CSR) reporting is a way for a firm to communicate about the economic, environmental and social aspects of the firm's operations, the challenges and prospects of the future. Organization's corporate social responsibility reporting has turn into a critical strategic initiative that can provide the managers with useful information about the company's development. This section depicts the evolution and current state of sustainability reporting, as well as the criticism towards it and motivators driving organizations to do sustainability reporting. Finally, this section also makes an overview on the sustainable supply chain reporting literature.

3.1 Theoretical implications of sustainability reporting

According to Deegan (2002,) legitimacy theory is based on a company's need to have legitimacy in the sense of getting a social "license to operate" to be able to access the necessary resources to successfully lead business. It implies that firms will take measures to ensure that their performance and activities are acceptable to the community (Wilms-hurst & Frost 2000, 11). Legendre and Coderre (2013, 184) view legitimacy theory's role in sustainability reporting as an aim to claim legitimacy to external stakeholders by showing them the firm's adherence to social norms and expectations. It enables companies to receive support from the society. The legitimacy theory presumes that company will operate within the boundaries and norms of society. But those boundaries and norms change over time and require companies to also react to such changes (Deegan & Brown 2002, 22).

Most studies about sustainability reporting adopt or consider some theory discussing stakeholder theory, even though many studies mainly refer to stakeholders in general, without referring explicitly to stakeholder theory (Hörisch et al. 2014, 329). Need for recognize the role theories play in addressing sustainability challenges. Stakeholder theory emphasis the purpose of business is create value for stakeholders, which widens the

audience beyond just shareholders. Capitalism stresses the interconnected relationships between a business and its stakeholders.

Not all organizational behavior is simply rational and predictable, motivated by maximization of organizational efficiency and effectiveness. Actually, institutional theory was established as a response for that. Institutions create pressures on individuals and organizations which operate within their own area of influence, having the power to forcing social actors to adopt similar structures, processes and practices. As a result, organizational structure, process or practice might not be the result of a calculated managerial decision but rather the need to conform to institutional pressures. (De Villiers and Warren, 2018 36). Zeng et al. (2017, 55) also discuss institutional pressure (IP) as the influence of the institutional environment comprised of social norms, culture or rules. According to Dubey et al. (2017, 1121) institutional theory can help to understand both the adoption of practices and the intention behind their adoption. The similar styles of approach have been adopted in by researchers in the field of sustainability reporting. It is not only a rational exercise in offering useful information to investors and other stakeholders or a way to manage legitimacy as a strategic resource.

Three types of isomorphic pressures have been identified by DiMaggio and Powell (1983, 147) which institutions may exert and which may impact the work of the organization. The three isomorphic pressures are coercive, normative and mimetic pressure. Coercive is normally the result of laws, regulations or societal pressures, compliance drives from the respective prescriptions. Dubey et al. (2017, 1122) define coercive isomorphism as the outcome of formal and informal external pressures. Cavusoglu et al. (2015, 388) sees coercive pressure as an impetus creating homogeneity among organizations through uniform pressures exerted by other organizations and cultural expectations. Second, normative isomorphism is obvious when organizations feel compelled to stick to codes of best practice, industry norms, ethical standards or generally accepted practices in order secure legitimacy. Organizations presumably adjust their behavior based on what they believe is viewed as appropriate among members of their social networks (Cavusoglu et al. 2015, 388). Dubey et al. (2017) call normative isomorphism as the result of professionalization. Lastly, mimetic isomorphism illustrates a situation where a company seeks legitimacy by copying the actions or behavior of the most successful or prominent entities which have already gained a state of legitimacy. Cavusoglu et al. (2015, 388) mention the following of the early movers and practices of similar organizations due to mimetic pressure. As industry leaders adopt advisable best practices, and also apply these

in the corporate reports, it is reinforcing the normative isomorphic pressure by the mimetic replication of disclosures by less-renowned industry members trying to seek legitimacy. Dubey et al. (2017) discusses mimetic isomorphism as the outcome mimicking other organizations actions in situations where there is limited clarity of organizational goals or when there is insecurity with regards to the environment in which an organization operates.

3.2 State of sustainability reporting

Non-financial reporting has been a subject of academic examination since the 1970s (Fifka 2013, 2). On that decade big western companies started to publish information about equal opportunities, social benefits for the employees, product quality and contributions for the local communities. The disclosures were mainly informed as a part of the regular annual report. Two biggest developments in the 1970s were the expansion of reporting practices to also include non-financial information and the development of stand-alone reports to convey that information (Fifka 2013, 2). In the 1980s the focus of reporting remained on social issues as did the research on voluntary reporting. However, there were few early studies on the slowly increasing practice of environmental disclosure. When coming to the 1990s the focus shifted to environmental reporting (Kolk 2003; Hahn & Kühnen 2013) but still the social dimension did not disappear from reporting, even though also academic studies started to shift their attention to environmental reporting. For instance Niskala and Pretes (1995, 457) are referring to the shift from employee information to environmental information in reporting practices after the end of the 1980s. According to Herzig and Schaltegger (2006, 306) the corporate environmental accidents and disasters like the Chernobyl nuclear power plant accident where the reason for companies to start publishing these environmental reports. Companies tried to increase the legitimacy of their operations through environmental reports. After the turn of the millennium, separation between social and environmental reporting removed and both dimensions were merged under same non-financial reports, issued under titles Corporate Social Responsibility Report or Sustainability Report. Also following Elkington's 'triple bottom line' approach, economic issues were included as well. The same development is seen also in the empirical literature. Most of the older studies had clearly examined either 'environmental' or 'social' reporting, while the newer studies after the end of 1990s

mainly refer to ‘responsibility’, ‘sustainability’ or ‘corporate social responsibility’ (Hahn and Kuhnen 2013, 5; Montiel 2008, 246).

Standardized reporting guidelines in environmental and social reporting had developed for the growing demand of corporate visibility, transparency and accountability (Toppinen et al. 2012, 191). Attempts to standardize and specialize the format of sustainability reports have led to the Global Reporting Initiative. The first version of the Global Reporting Initiative’s (GRI) sustainability reporting guidelines (G1) was launched in 2000 (Globalreporting.org). Global reporting initiative (GRI) gives standards and guidelines for how to make a report that will be more comparable and reliable. “A sustainability report should provide a balanced and reasonable representation of the sustainability performance of a reporting organization – including both positive and negative contributions” (GRI 2020). The first GRI standards were expanded (G2) in 2002 and in 2006, the third guideline, G3, was released. GRI launched the Global Action Network for Transparency (GANTSCh) program in 2009 which was later renamed Business Transparency Program (BTP). Large multinational organizations can encourage their suppliers to understand their sustainability impacts and take ownership and manage those impacts by introducing sustainability reporting. It is focused on reaching Small and Medium Enterprises (SME), that are part of the global supply chains (UN Global Compact). G4 guidelines were launched in 2013, effective for reports filed after 31 December 2015. The new guidelines recommend businesses to focus the issues that are most important for the organization and have economic, environmental and social impacts. This change is expected to help companies to concentrate on things that really matter and result to more focused, strategic and credible reports that are also easier to readers to navigate through (the Accountant, 2013). It also included standard disclosures for ethic and integrity, governance and anticorruption (Reuters events 2013). There is also changes in greenhouse gas emission guidelines. The G4 reporting guidelines were displaced by GRI Standards. GRI standards became required for all reports published after first of July in 2018. Some of the changes of the new GRI standards are providing more clarity on the distinctions between requirements, recommendations and guidance.

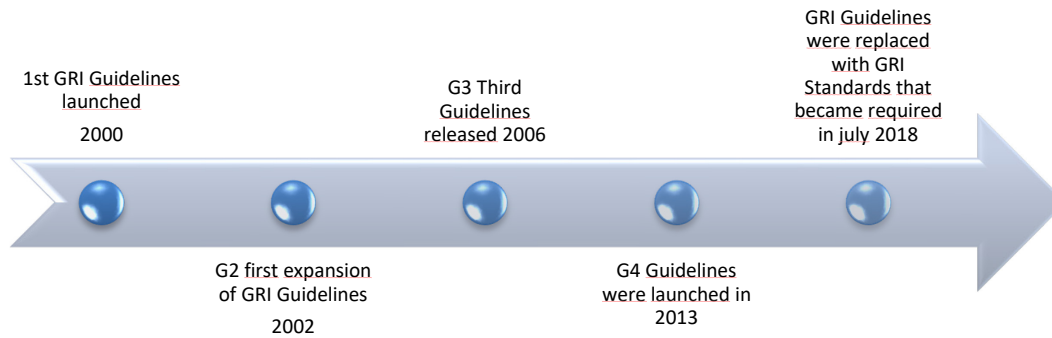


Figure 2. Timeline of GRI Guidelines and GRI Standards

As stressed already, sustainability means the whole concept in how the resources will be used so that they last also for the future generations. But when talking about corporate social responsibility, things are observed from the company level, by examining the situation in the firm with the stakeholders.

The current trend and the next step in sustainability reporting seems to be integrated reporting (IR). The integrated reporting aims at reporting of all the different capitals (financial, intellectual, manufactured, social and relationship, human and natural) in one report. It tries to bring more cohesion and efficiency to reporting process (IIRC).

Currently companies are mostly reporting sustainability information and data as a part of sustainability reports or their annual report. KPMG survey (2020) presents that in 2020 61% of companies are including sustainability data in annual reports. There has been a small growth in integrated reporting as now 16% of companies are publishing reports labelled as integrated report according to KPMG survey (2020, 12). The survey (2020, 15) also tells that GRI has remained as the dominant global standard in sustainability reporting. In 2020 67% of companies were using GRI guidelines or standards in their reporting and the growth from 2017 was +4%. Also, assurance of sustainability has kept growing during the last three years. The Assurance rate of the sustainability reports were now in 2020 51%, so the growth in last three years has been 6%. These companies have to report on environmental protection, social responsibility and working conditions, respect for human rights, anti-corruption and bribery, and diversity on company boards.

European Union has been driving big companies report more about sustainability related matters. It has regulated EU directive 2014/95 / EU, the Non-financial Reporting directive, in which bounds the “Public Interest Entities” to publish non-financial reporting

from 2018 onwards. The criteria defining these entities are over 500 employees on average throughout the financial year, and exceeding at least one of the two limits: a balance sheet total of 20 million euros or more or total net revenue from products and/or services sales to at least 40 million euros. (European Commission).

3.3 Criticisms towards sustainability reporting

There has been a lot of criticism toward sustainability reporting. Adams (2004) pointed out that companies do not completely reflect their reported sustainability performance. Moreno and Capriotti (2009, 170) who studied the websites of the top 35 Spanish corporations listed on the Madrid stock by using quantitative content analysis found, that the content is actually quite dispersed. Additionally, they found very little references to external parties serving as assurance providers for the claims made in the CSR information.

Adams and Frost (2008, 301) and Niskanen ja Nieminen (2001, 29; 35) notice that there is tendency of companies to report mainly positive disclosures. Niskanen and Nieminen (2001) studied the environmental reporting and the objectivity of the reporting. They compared the reporting with the news disclosed in the media and found that companies report less negative news than is reported about them in the media. The accountability of the reports has been questioned as well. Cerin (2002, 61) found some discrepancies between what actions are reported in CSR reports and the actual actions of the reporting firm. He also noted that the lack CSR report guidelines can lead to a great variety in the content of the reports. Solomon and Lewis (2002) noticed that only few incentives exist to disclose potentially harmful or negative information.

Lack of comparability of sustainability reports due to the limited generally accepted standard regarding what information should be disclosed and in what format is a recognized issue (Herzig & Schaltegger 2006, 310). There are also problems with the data quality and ensuring the quality of data collection procedures. Boiral (2013, 1036-1037) is concerned about the use of the sustainability reports and their expected benefits because presupposing the disclosed information being as transparent as possible and reflecting the firms' actual performance and impacts. There has been wide criticism toward the optimistic rhetoric used in the reports, the debatable reliability of the disclosed information, and the control over the disclosed information by senior management. Together these matters undermine the transparency of the reporting. Boiral (2013) is worried that critically judged sustainability reporting amount to an artificial and idealized representation that is disconnected from the reality.

Burrit & Schaltegger (2010, 829) outline that there are two main paths of sustainability accounting development. Those are critical theory perspective and management orientated path. The most critical perspective towards sustainability reporting is that sustainability accounting is basically a fad, and it will disappear in time. The second path, management orientated perspective to sustainability accounting recognize the importance of management decision making and sees corporate sustainability accounting as a set of tools that help managers to deal with different decisions. Burrit and Schaltegger (2010,843) argue that both of these paths are needed in the development. The critical path raises questions and issues, that are good to be aware of, especially by the managers. But still the managerial path is needed to do active pragmatic problem solving in the organizations.

3.4 Motivators of sustainability reporting

Main influencer for companies to want to maintain a positive socially responsible image is the pressure from internal actors and external stakeholders (Tate ym. 2010, 21; Hatch and Schultz 1997, 359). There is incentive to top management wanting to control the organization's image through communication with the CSR reporting. Earlier studies have showed up the positive link between an image of strong social responsibility and consumers' preferences. (Tate ym. 2010, 22; Bhattacharya & Sen 2004, 22). Montabon, Sroufe and Narashimhan (2007, 1009) found CSR reports to be a good sign of the relationship between corporate responsibility reporting and firm performance. Their study concluded that there is a "win-win" possibility between environmental management practices and firm performance. The practices were positively associated with multiple firm performance measures.

According to Cerin (2002) companies manage CSR reports as a marketing tool to enhance brand image among stakeholders. Wilmshurst and Frost (2002) talk about legitimacy theory that suggest firms publish CSR reports to benefit from enhanced corporate image among stakeholders. The voluntary reporting of environmental and social information helps maintain good relationships with publics and while firms trying to project a positive image to stakeholders, the most important thing for stakeholders is the company's reputation (Brown et al. 2006, Tate et al. 2010 p. 22).

3.5 Reporting on sustainable supply chains

Most significant corporate responsibility impacts of a company can often be out of its own operations, in its value chain. Either in upstream in the environmental or social impacts of its suppliers or downstream in the impacts of its products and services – through use and disposal. Sustainability should not be limited to the focal company's action. Any negative practice at any point of supply chain may affect negatively the company image, therefore the entire supply chain should meet the requirements of sustainability. According to Bowrey and Clements (2019, 28) only a very small portion of research examines CSR reporting along the entire supply chain. Bowrey and Clements still outline that more firms now acknowledge the need to align strategy with companies that uphold same ideals in relation to their impact on the environment and society. Participating in supply chains that are not effectively and diligently contributing to the environment and society, can expose a firm to an enormous reputational risk.

The use of greenhouse gas (GHG) protocol to report on greenhouse gas emissions has become a common practice for firms. The protocol helps companies to measure, report and manage greenhouse gas emissions through a framework. According to the GHG Protocol, the GHG emissions can be categorized into three scopes. Scope 1 emissions are direct emissions. This means that the emissions come directly from the company's own source, which are company facilities and vehicles, or from source controlled by the company. Scope 2 covers the indirect emissions from purchased sources, such as electricity consumed by the company. Scope 3 includes all the indirect emissions within the entire value chain. In other words, scope 3 tracks both upstream and downstream supply chain emissions. Tracking the emissions from the whole value chain is tricky but it also offers more potential for decreasing emissions compared to a model where each operator of the value chain tries to cut its own emissions. Concentrated emission tracking offers an opportunity to do more strategic modification for the operations such as a shift to circular innovations. Lately there has been a trend of big companies setting carbon emission neutrality goals for their businesses. Most of these net-zero goals aim for scope 1 or 2 limited carbon neutrality. Climate Action 100+ network published a NetZero Company Benchmark in 2021 and noted that the alignment of value chain GHG emissions is often a blind spot for companies, since only half of them aim for the net-zero goals on the scope 3 level. It has been estimated that scope 1 and 2 emissions are on an average responsible only for 10-20 % of the value chain emissions (HS.fi). Hence, there would be plenty of

untapped potential for carbon emissions reduction if companies would shift to analyze the GHG emissions from the scope 3 view. (UN Global Compact; Climate Action 100+; GHG Protocol).

Similarly to the GHG emissions reporting, according to KPMG corporate sustainability reporting survey (2013, 65), most companies discuss sustainability impacts of their supply chain in a limited level or with no discussion at all. In the survey, the declaring targets for the management of environmental and social impacts of their supply chain was also patchy. Less than 50 % of the reporting G250 companies declare targets and from those who had declared supply chain targets only 49 % reported progress. The survey also shows that 53 % of the G250 companies discuss the impacts of the product and service in detail in the report. And additional 35 % discuss in limited level, leaving 12 % not discussing impacts of the product and service in the report.

The GRI G4 Guidelines include a better focus on the supply chain. Guidelines point to the importance of management and disclosure in the area of supply chain. It is more complex to assess the impacts in the supply chain than measuring only companies' own impacts. Also, the measurement methodologies are subject to more uncertainties. Still that should not prevent companies from building stronger partnerships with their suppliers to enhance social and environmental footprints. Especially nowadays with growing public attention on the responsibility of large companies, the risks of not doing so keep increasing. The Global Reporting Initiative includes key indicators of sustainability including questions related to supply chain.

In KPMG study of corporate responsibility reporting from 2013 one of the key conclusions was that "supply chain reporting needs more focus". According to Elias Mota et al. (2019, 88) sustainability reporting has been firm-focused instead of being supply chain oriented. They argue that the firm-centric approach can be biased because, for example, reduction in emissions in focal firm can actually be result of an increase in the total emissions of the supply chain in which it operates.

4 PULP AND PAPER INDUSTRY

When reviewing the sustainability reporting in pulp and paper industry overview of the industry is needed to understand the characteristic features of pulp and paper industry. This chapter presents glance to the pulp and paper industry. Firstly the 4.1. industry overview will introduce shortly the pulp and paper industry. The 4.2. chapter will outline the characteristics of pulp and paper supply chains. After that, chapter 4.3. displays the sustainability issues that are common in pulp and paper industry. Lastly chapter 4.4. discusses about the literature of sustainability reporting in pulp and paper industry.

4.1 Industry overview

The pulp and paper industry presents an interesting example for the study of sustainability reporting practices since it has high production volumes and, therefore its operations cause large sustainability impacts. The industry is a typical high emission and high energy consumption industry (Zhao, Ding, Wen & Toppinen 2019, 725). The pulp and paper industry has its own special features and structure. It is highly environmentally sensitive sector. Because of the wood raw material, it is associated with the global greenhouse gas balance (Toppinen, Li, Tuppuru and Xiong 2012, 191). The industry has a competitive structure that puts pressure on costs and cost-effectiveness. Various ethical and environmental issues need to be regarded in this industry. Yearly paper use has been growing year after year. Global paper production hit 400 million tons per year in 2014. Global paper production has doubled since 1985 and it is projected to grow to 482 million tons in 2030. Paper products make contribution to communications, education, packaging and personal healthcare. There has been big geographic shift of manufacturing from US, Canada, Western Europe and Japan to Asia and Latin America. Majority of the consumption of paper is happening in developed countries. For example, the entire continent of Africa accounts only 2 % of global paper use. In 2015 worldwide demand for graphic paper decline for the first time in the history. But still the paper and forestry-products industry as a whole is growing as other products are filling the gap of shrinking graphic-paper (McKinsey, 2019). The sector has a remarkable impact in environment and business in the Europe. In Scandinavian countries the paper and pulp industry corresponds to a significant part of the industrial activity and generates a significant portion of the GDP. (Frota Neto, Bloemhof-Ruwaard, van Nunen and van Heck 2008, 200).

The selection of wood base products is wide. Paper products are one of the biggest product groups using wood as a raw material. There is growing demand for wood-based product group in packaging materials. Technological development and digitalization has been decreasing the use of printed paper but the development of online shopping and the development of urbanization has been increasing the demand for packaging material (Kauppalehti 2017). There is also rapid growth in sanitary paper, still accounting for less than 10 % of the whole global consumption of paper.

The two biggest subindustries are pulp and paper industry and sawmill industry. The pulp and paper industry mainly produce paper, bristol board and packing board. Pulp based products are replacing many oil-based products, example future growth in the clothing industry is expected, if the textile fibre production in large scale will happen. The sawmill industry is out the scope of this study, and there for not more closely observed.

Industry is expanding especially in Asia and South America. A shift of the production from western countries to developing countries has gotten increasingly common. One reason behind the shift might be the lower cost level. The change has also been making the industry supply chains more global and complex.

Bioeconomy has been an emerging concept in pulp and paper industry, particularly in Europe. Bioeconomy relies on renewable natural resources to produce energy, products or services. According to Kutnar, (2016, 1) bioeconomy comprises from the parts of the economy that use renewable biological resources from land or sea to produce materials, food and energy. The purpose of bioeconomy is to reduce the dependence on fossil natural resources and prevent biodiversity loss. It can also create new economic growth in line with the sustainable development. It has been attracting increasing attention in the last decade. It could include great opportunities for the forest sector, that might blur the traditional borders. Biorefinery technology is key concept for becoming part of bio-economy in forest sector. Pulp mills generating bioenergy can contribute to the local energy supply in addition to powering the mills. Also, pulp production residues and side streams can be turned into biofuels, biochemicals and bioplastics. (UPM.fi)

4.2 Pulp and paper supply chains

Most of the raw material is sourced from the forest owners in European pulp and paper companies. Sourcing of the raw material for pulp and paper industry means purchasing of both virgin materials and recovered materials. Northern Europe has large forest areas

which means that big portion of the raw material comes inside of Europe. Europe also has a high recycling rate in paper, which means that there is also recycled material market in Europe. The origin of the sourced is usually tracked through follow-up systems and requirement for certification is many times a standard.

Pulp and paper manufacturing is capital intensive field. Manufacturing process needs big paper machines and those machines are running around the clock almost year around. The manufacturing process is production driven making large productions batches. The trend has been that pulp and paper factories have been growing bigger and the measured effectiveness of production has been increasing. (Subardin et al. 2018, 284).

Bloemhof-Ruwaard, van Wassenhove, Gabel and Weaver (1996, 615) define the parts of the life cycle of pulp and paper products as: forest management, pulp production, pulp bleaching, paper consumption waste management and transportation. Similarly, Zhao et al. (2019, 726) highlight that life cycle of pulp or paper products include multiple processes such as forest tending, wood harvesting, preparation, pulping, papermaking, product distribution and product using, which are all consuming a lot of electricity. All of these parts have impacts for the environment.

Pulp and paper industry is investment heavy industry. When investments are done, they are expensive but on the other hand there is low innovation intensity in this industry. Lately there has been a tendency to focus on making the manufacturing more resource efficient. It can mean better utilizing of the side streams and scraps of the main manufacturing processes and also taking environment into consideration already in the designing stage. New technologies can also enhance the environment and energy efficiency. (Metsägroup.com; UPM.fi).

The ongoing globalization of the industry is partly making the industry environmentally sensitive sector (Toppinen et al. 2012, 191). Shifting of production capacity to low-income countries, is making also European pulp and paper industry more exposed to growing vulnerability of competitiveness and company sustainability image (Pätäri et al. 38). In the western world the markets are mature. Companies in the industry are operating internationally in many countries, and in many continents. There has been increase in international firms operating in global market. There is also emergence of new production regions. The pulp and paper products are sold worldwide so the transportation distances can be long and as it had been mentioned earlier, the industry is significant in size, so transportation volumes are big (Metsäteollisuus.fi).

4.3 Sustainability in pulp and paper industry

Traditionally the pulp and paper industry has been one of the most environmentally sensitive sectors due to its use of energy, heavy dependence on water, and also due to the vitality of forest ecosystems as a source of wood fiber (Toppinen, Pätäri, Tuppurä and Jantunen 2017, 1). Recently, however, a need for transformation towards a more conservation-based economy has been noted. Business leaders in forest industry are expected to further advance social goals and to react to new threats of destructive forces, for example by contributing to poverty alleviation, combating climate change and promoting sustainable forest management (Toppinen, Li, Tuppurä and Xiong 2012, 192). Pätäri et al. (2016, 38) state that the key challenge of the pulp and paper industry in Europe is to achieve a transformation towards bioeconomy and realize the necessary new green innovations. Pätäri et al. (2016) explains that the milestones The European Union has set for cutting its carbon emissions by 2030 to a level that is 40% below the level of the year 1990 emissions, are planned to be achieved through domestic reductions, improved energy efficiency and greater use of renewable energy sources. Such ambitious targets like these are pushing the organizations to change their operations.

The internationalization of big forest industry firms has led to expansion of plantation area and pulp production in the developing countries, which has caused concerns regarding the possible threat of overuse of forest resources and negative impacts on biodiversity, degrade of land or water quality (Toppinen et al. 2015, 163). Also, KPMG (2012, 14) identified ecosystem decline, material resource scarcity and deforestation as three of the ten major sustainability megafactors, globally influencing business environments. Hence, there is a need to reduce the global paper consumption. Future direction is to maximize the recycled fibre content in the products. This technology plays a key role in reducing the industry's manufacturing footprint. It is important to maximize the recycled fibre content in all grades of paper products and also develop 100% recycled products.

One way to affect the recyclability is to minimize waste by maximizing recyclability in the products. Supporting recycled paper manufacturing also means that the collection systems of recyclable paper need to be in efficient enough level to secure the supply of recycled fibres. The use of recycled fibre in the paper production requires the right kinds of recovered fibres and in large enough quantities for the products they are manufacturing. So, to support these developments, countries should increase or initiate recycling collection processes to meet the growing demand. In 2014 the worldwide paper recycling rate

was 57,9 % which is relatively high, but the problem seems to be that the sorting of the recycled material is insufficient. Mills producing recycled paper may receive paper types they cannot use. Poor sorting makes it difficult to accurately assess the availability of specific grades of recovered paper. Also the Confederation of European Paper Industries (CEPI) points out, in their 2030 Industry Manifesto, that to achieve stronger forest-based circular economy there is need for regulatory support to further harmonization and improvement of European waste collection systems to accomplish large scale and high quality recycling.

It is also possible to use other recovered materials than wood fibre as a source for paper. Most used non-wood fibers as a pulp and papermaking material are straws, sugar cane bagasse, bamboo, hemp, kenaf, jute, sisal, cotton linters, and reeds (Ashori 2006, 1134). All these actions are strengthening the circular economy and helping to minimize the industry footprint.

Challenges in the social responsibility exist as well. For example, indigenous people struggle to have their rights to be respected (Nylund and Kröger 2012, 232). Progressive paper companies will respect the right of communities affected to object plantations and mills. They would try to seek a way to work with them as allies and supporting their economic diversification. However, there is still room for wider adoption of policies that respect human rights. Particularly wood suppliers should be required to report on how they respect the human rights in their operations.

It is also the responsibility of customers to investigate their suppliers and react when negative social consequences are revealed. For example, in Brazil, there continues to be conflicts over land acquisition for eucalyptus pulpwood plantations (Kröger and Nylund 2012, 74). These plantations take over community lands, and also consume large quantities of water, affecting close streams which are drying up agricultural lands and damaging water quality (Finnwatch 2009, 9). Clements and Fernandes (2013, 42-43) discuss about the evolution of land grabbing, and how countries like Brazil, which have a history with this phenomenon, have an unequal land structure in which small proportion of landowners possess a high percentage of the rural and agriculture land. Clements and Fernandes point out that after the land acquisition costs have increased in Latin America, investors have started to favour countries in Sub-Saharan Africa, where the land is cheaper. Environmental Paper Network (EPN) reported about European pulp and paper company Navigator Company making a mill investment in Mozambique, and also acquisitioning land for

eucalyptus plantations which indicates that these matters are also relevant within pulp and paper industry. (Environmental Paper Network 2018, 28; 2017, 5-6).

Reported depletion of species has also raised questions about the effects of forest cultivations. Lahtinen, Guan and Toppinen (2016, 130) identify increasing awareness about the opportunities and threats involved with biodiversity loss and that for biodiversity loss have gained increasing company attention. It is a factor that affecting companies' future strategies and survival. Declining of the nature's biodiversity could be potential threat to wood and paper industry, because it might decrease the acceptability of the use of forests.

Avoiding to source from unknown or illegal sources can further more responsible sourcing in the pulp and paper industry. Certification programs, for example, try to prevent the use of fibre from endangered forests and high conservation value forest, ecosystems and habitats. The use of fibre from conversion of natural forests into plantations for paper fibre should also be avoided. Fibre from degradation or loss of high carbon stock forests can also be harmful for the environment. It would be better if companies would prefer locally sourced and sustainably produced fibre. In northern hemisphere paper is produced by logging natural forests. Its impacts are worrying because the slow-growing nature of the northern forests. On the other hand, in the southern hemisphere the increasing paper production is causing rapid expansion of pulp plantations, which contributes to the loss of the rainforest area and critical habitats. Deforestation is concentrated in the most carbon-rich and biologically diverse habitats. (EPN 2018, 36-37).

Recent studies have shown how land use changes related to pulp fibre production are major sources of greenhouse gas emissions. Overall, the impact of forest plantations on the climate is starting to become more evident. Some positive development regarding land use in forestry can also be detected. Due to some recent efforts to improve the governance regarding illegal logging, there has been significant decline in illegal logging. This can be regarded as a positive direction because over the past decades, illegal logging has been one of the drivers of deforestation. (EPN 2018, 39).

Use of genetically modified trees as a source of fibre is still quite debatable due to lacking risk assessments. Assessing the risks is difficult because of the complexities related to the assessment process. Trees as organisms are complex; they have large habitats and lot of interactions. There has happened an expansion of GM tree trials. Increasing demand of pulp fibres and shrinking availability of plantation land are increasing the interest toward transgenic trees that can potentially offer higher yield or higher productivity.

Due to the still unknown risks for ecology and socio-economy, for example Global Paper Vision guides paper companies to refuse to source fibre from GM organisms. (EPN 2018, 40)

Sourced virgin wood fibre for paper should come from forest managers that have independent, credible, third-party certification. Most recommended international certification program is The Forest Stewardship Council (FSC).

Pulp and paper industry is one of the biggest polluters in the world, fourth in Europe (European Commission 2018), and also one of the largest users of fresh water and energy (Gopal, Sivaram & Barik 2018, 83). The process of manufacturing paper uses on average 10 litres of water to make an A4 sheet of paper. These numbers show how extremely water intensive industry the pulp and paper industry is –probably more so than any other industry. The sector is in addition the fifth largest consumer of energy. Production is also chemically intensive, releasing toxic chemicals into waterways as effluent which can pollute rivers and harm ecosystems. The developed wastes are often times not handled properly and wastewater can be in some cases allowed to mix with water sources like rivers (Gopal et al. 2019, 83). Industry has been slow to adopt advances in technology which can deliver water reductions and energy savings, and also less toxic production methods.

In Europe the stakeholders like the environmental NGOs have started to pay attention to the environmental practices of the industry, which has resulted into authorities setting stricter emission requirements (Donner-Amnell & Rytteri 2010; Mäkelä 2020, 15). Techniques exist for converting produced waste into useful energy and it is even possible to produce biofuels from the waste (Gopal et al. 2019, 83). Clean tech solutions and innovations are needed in the new mills and there could also be efficiency improvements implemented in the existing mills (EU 2018). EU has published a report called EU forest based industries 2050: a vision for sustainable choices in a climate-friendly future. This report envisions how the European Forest-based Industries can contribute to the 2050 climate neutrality target. The report (2018, 3) presents that industrial ecosystem change towards more circular bioeconomy is needed. The five goals mentioned in the report (10-11) are: 1.) substitute fossil energy and CO₂-intensive raw materials with forest-based alternatives. 2.) close material loops and having high sector targets to material collection and recycling rate. 3.) Drive resources-efficiency by enhancing productivity in materials, manufacturing and logistics. 4.) Meeting increasing raw material demand by maximizing secondary streams and ensuring primary raw material supply from sustainable managed

forests. 5.) Offer climate-friendly products by increasing use of wood and wood-based products in daily lives.

Asia, Latin America and Africa are lagging behind in the progress towards better transparency (ENP 2018, 68). This has implications also to the supply chain level as the upstream companies are lacking in participation in the reporting. In future, these countries should be engaged better to the use of voluntary and mandatory disclosure instruments in the future. This is particularly important because of the shift of manufacturing locations, i.e., factories are replaced from western locations to these less transparent places.

Information sharing is inexpensive and fast, and easier to do than ever before. It also means that nowadays it is difficult to hide facts. Transparency has increased. It is important that companies commit to regular, transparent, publicly available and comprehensive reporting on their progress. It is also important that the reported information does not include any consumer misleading false environmental claims which can be interpreted as greenwashing. Reporting priorities should be developing binding policies and targets which would have time-bound process for achieving the targets. (EPN 2018, 66).

4.4 Sustainability reporting in the pulp and paper industry

According to KPMG study of corporate responsibility reporting 2020, Corporate responsibility reporting rate was in forestry and paper industry was 80% in 2020, which indicates a three per cent increase from 2017. As a sector forestry and paper industry was little above the average reporting rate. But in 2011 the level of CR reporting in forestry, pulp and paper sector was 84%, being on the top with equally high percentage with mining sector (KPMG 2013, 27). Compared to that, the current reporting rate is still lower than during the peak year.

In the newest KPMG's Survey of Sustainability Reporting one of the focus points was the reporting of risk off biodiversity loss. When comparing different sectors reporting about of biodiversity risk, mining was the leading sector with 51% reporting rate. Forest and paper industry came second with 40% reporting rate. The forest and paper sector is categorized as a high-risk sector to have an effect on biodiversity loss. When combining high-risk and medium-risk sectors the reporting rate on the risk of biodiversity loss to their business was 23% in 2020.

Many studies have compared the sustainability reporting between different industries and environmental indicators are most often reported by the forest industry companies.

Environmental responsibility was the most commonly reported area in many studies focused on global forest industry reporting. Sinclair and Walton (2003) were studying the environmental reporting of forest and paper companies in early 2000. They were focusing on disclosures in forest management and fibre procurement because those recognized as the key stakeholder concerns. They reported that under half of the hundred subject companies were publishing a corporate environmental report (Sinclair & Walton 2003, 330). Most commonly reported themes were: followed certifications, sustainable forest management, water and energy management.

Li et al. (2010, 299) identifies that environmental and economic responsibility are overemphasized compared to areas concerning human rights, labour practices, social responsibility and product responsibility. According to Li et al. the forest industry is focused on reducing environmental footprint and promoting sustainable forest management. They are hoping more proactive role from the reporting companies towards furthering social goals.

Mäkelä (2020, 4) states that the forest industry is doing well at measuring the environmental aspects of their own production and they have been able to decrease the environmental impacts during the last decades. According to Mäkelä (2020, 5) forest companies typically report on energy usage and production and also about the air and water emissions produced. Mäkelä also identifies areas where the reporting requires improvements. Those are covering the variety of environmental impacts caused by the operations and putting more attention on what happens in the production chain before and after the mills.

There have been studies on sustainability reporting on forest/ pulp and paper industry, but not really ones focusing on the supply chain view. Also, most of the studies about reporting on pulp and paper industry have focused on observing the reports of certain year but not many studying a longer time period by doing a longitudinal research and the possible changes or transformation of the sustainability reporting.

5 METHODS AND MATERIALS

The objective of this study is to identify themes and analyze the traceable trends in the development of reporting on supply chains in sustainability reports. The chosen method for analysis is content analysis. The data consist of sustainability reports from the ten biggest pulp and paper companies from the past decade. This section first describes the materials used in analysis, then methods, and finally the research process.

5.1 Materials

Empirically the scope of this research is on European pulp and paper companies. This geographic scope was chosen because European companies have been the forerunners of sustainability reporting. Some of the northern European pulp and paper companies have even receive recognition from their sustainability reporting. The companies used in this study were selected using the Thomson Reuters Eikon database and its listing of European stock exchange listed companies in the field of “Paper products”. From that list, the ten biggest companies were selected to analyze their sustainability reports from past ten years – from 2010 to 2019. Since this research is a longitudinal study, sample size was limited to ten companies. Ten 10 companies combined with the 10 -year observing period already yield potentially a sample of 100 reports. The sample was limited to large pulp and paper companies. There have been studies presenting evidence how larger companies are more likely to have resources available to support sustainability activities and reporting (Piecyk & Björklund 2015, 464). Companies were arranged in order based on size of market capitalization value, to choose the ten biggest companies for the data. The observation period of the sustainability reports was fixed from year 2010 to 2019. This period is expected capture the growth of the sustainability field, as well as the progression of sustainability reporting. As a selection criteria was that a company had published at least one sustainability report in the past ten years. The reports were restricted to reports written in English because otherwise the content analysis would have become too complicated.

One company, Ahlström-Munksjö was removed from the ten biggest companies- list because the company had recently merged from two big companies Ahlström and Munksjö. Observing the sustainability reporting from the past ten years for this company would have been difficult and, therefore, a decision to leave Ahlström-Munksjö out of

the sample was made. As a replacement, the eleventh biggest company of the listing – Duni was included in the sample.

Data was gathered manually from public sources. Sustainability reports were collected from the web sites of the sample firms, since public availability of this kind of information is important to companies. In the early 2000s increasing number of companies started to use the internet as a platform to publish their sustainability reports to reduce the information asymmetry. Data was collected during a two weeks period. The data collected was not restricted only to sustainability reports. Also, sustainability information published as a part of annual report was included if the company did not publish sustainability report. A total of 79 sustainability reports or sustainability information including annual reports were gathered. The final sample size used in this study resulted in 4684 pages of sustainability information from the reports. There were two companies Duni and Ence that did not have all the reports available in the internet. Duni didn't have annual reports from 2014 and 2015 available in a downloadable format. There was a reading-use only versions available for those years in the web page. For Ence, the year 2013 sustainability report was missing and for the year 2014 there was only a Portuguese version available at the webpage. Table 1 lists the subject firms. It also lists the names of the gathered reports with publishing year and number of pages of each report.

Table 1. The companies of the data

Firm name	Title of report	Period	Total pages
Altri SGPS	Non-financial reporting part of annual report; Sustainability report	2016; 2017-2019	2 84; 158
Duni AB	Annual report	2010-2013; 2016-2019	1 ;2 ;4 ;3 28 ;8 ;15 ;20
Ence Energia y Celulosa SA	Sustainability report; Annual CSR report	2010-2012; 2015-2019	105; 97; 116 77; 76; 77; 182; 210
Holmen AB	Sustainability report; Annual report – including sustainability report	2010; 2011-2019	52 12; 12; 12; 12; 14; 14; 15; 15; 29

Metsä Board Oyj	Sustainability information in annual report; Sustainability report (Metsä Group)	2010; 2011-2019	17 36; 53; 57; 62; 70; 71; 72; 75; 102
Navigator Company SA	Sustainability report (released every two year between 2010-2016); Annual report 2017-	2010-2019	141; 143; 154; 129 24; 125; 134
Svenska Cellulosa SCA AB	Sustainability report; Annual and sustainability report	2010-2016; 2017-2019	68; 72; 76; 68; 68; 72; 75 30; 41; 51
Semapa SGPS SA	Sustainability report (2019-2018); Annual report – Non-financial statements (2017)	2017; 2018-2019	2 66;51
Stora Enso Oyj	Sustainability report	2010-2019	48; 61; 68; 77; 101; 82; 73; 74; 73; 73
UPM-Kymmene Oyj	Annual report/ Integrated report	2010-2019	49; 45; 29; 20; 18; 36; 39; 44; 40; 48
All reports together		2010-2019	4684

While collecting the data for the analysis it was detected that not all the big European pulp and paper companies have that long of reporting record yet. The ten-year examination period that was set as the research period, turned out to be longer than the reporting history of some of the subject companies. For example, Semapa had started they sustainability information publishing in 2017 as a part of their annual report, and they had published two sustainability reports in 2018 and 2019.

5.2 Method

This research was done by using content analysis as a research method. The research frame supports the use of content analysis because relatively few studies have been conducted by utilizing it as a method within this area of research. One of the advantages of using content analysis is that it allows the use of computer-aid analysis tools. The decision to do longitudinal research was based on the strongly developing nature of the sustainability reporting. Compared to for instance to financial reporting sustainability reporting is still in its infancy and is expected to mold to more consistent and comparable form.

The choice of the method for this research wasn't that simple though. Lock and Seele (2015, 25) explain that the field of business ethics, which covers also sustainability and corporate social responsibility, is still relatively young academic discipline. First the research focused mainly on philosophical discussion of moral values and it relied very little on business and management studies. From 1982 to 2008 the percentage of empirical articles rose from 2.9% to 35%. Still the use of research methods is not very systematic. Which has created a need for more systematic use of research methods in this field.

Content analysis is a method first used within empirical social science and it can be applied both in a quantitative and a qualitative way (Seuring & Gold 2012, 546). It has been widely used in corporate social and environmental responsibility research (Jose and Lee, 2007, p. 311). Content analysis has proven to be an efficient tool also in the field of analyzing CSR (Lock and Seele 2015, 37). In essence, it is a research tool used to discover how certain words and concepts are present within text. Different scholars have given different definition to the method. Holsti (1969), for example, described content analysis as a "technique for making inferences by objectively and systematically identifying specified characteristics of messages". Krippendorff (2004, 19) articulates that replicability is the most important form of reliability and he defines content analysis as "a research technique for making replicable and valid inferences from texts to the contexts of their use". According to Weber (1990, 9) content analysis is a research method that uses a group of procedures to make valid inferences from text. The inferences can be about the message itself, the sender of the message or the audience of the message. Weber points out few examples of content analysis (adapted from Berelson, 1952) including audit communication content against objectives; reflect cultural patterns of groups, institutions or societies and describe trends in communication content.

Considering the above, content analysis is a particularly suitable method for examining trends and patterns from the text documents. Since the objective of this study to identify themes from the content of the reports and evaluate the development of sustainability reporting, content analysis makes a good fit to the task. In this study, a software called Leximancer was used as a research tool to perform the actual data analysis, i.e., the organization of large literature of sustainability reports and the exploration of the content on a conceptual level. In the interpretation state the results were viewed through the SSCM framework that was established in the Chapter 2. This enabled that, the results of the content analysis of the sustainability reports were tight together with the supply chain perspective. The inferential logic applied in this study was abduction. According to Plowright (2016, 39) abduction starts with the result or group of findings and then draws on a known principle or idea or conceptualization to identify a reason or cause of the finding. He describes the process of abduction as a creative process that is innovative, conjectural and retroductive.

A specific strength of content analyses is that the method can combine qualitative approaches retaining rich meaning with strong quantitative analyses (Seuring & Gold 2012, 546). The coding of the software is based on quantitative theory but the software presents the data in visual way, creating a phase for qualitative analysis. Using computer assistant software made it possible to handle larger amount data, in this case more sustainability reports, and this is why Leximancer was chosen as the software used in this thesis.

Leximancer is an automated content analysis (ACA) tool. ACA discovers concepts that are defined as groups of words that are strongly correlated in the data and are therefore likely to represent a common theme or idea (Nunez-Mir et al. 2016, 1263). Leximancer is a visual text analytic software tool. It combines conceptual analysis, relational analysis and cognitive mapping. Leximancer generates by itself own lists and relationships based on the input text without requiring analysts to iteratively design lists of concepts and codes (Angus, Rintel & Wiles 2013, 262). Another reason to choose Leximancer was that, according to Angus et al. (2013, 262) this automatic generating of the concept list is statistically reliable and reproducible, unlike in manual coding which requires checks for coding validity and reliability. Leximancer is a machine learning based software and it uses word occurrence and co-occurrence counts to mine major thematic and conceptual content straight from an input text.

According to Nunez-Mir et al. (2016, 1263) the big step forward in ACA development was when Latent Dirichlet Allocation (LDA) model represented that the order of words in a document is important. Nunez-Mir (2016, 1270) also highlights that ACA possesses two characteristics that contribute to its utility. Firstly, ACA is able to process large amounts of text a lot more quickly, and secondly it excludes unintentional human bias compared to manual content analysis. ACA softwares are designed to identify higher levels of complexity of hidden thematic structures, such as concept hierarchies, syntax, document networks and current trends in themes which furthers our ability to visualize the literature and explore more of it. The software creates the concept map based on how frequently concepts co-occur in the text.

Leximancer groups the clusters of co-occurring concepts into themes. Next, those themes are heat-mapped according to the importance of the themes (Spry & Dwyer 2017, 1051). The most important theme appears in red and orange, and from there they turn more colder tones (blue and green). The themes help interpretation by grouping the concept clusters and are showed as the coloured circles on the map. The theme size is adjustable. It is always set to 33% at first but it can be adjusted smaller or bigger creating either fewer, broader themes or more tighter themes. So, the circle size does not really illustrate importance of the circle. The size is defined by the concepts that are appearing together the most, and theme size can be adjusted by the researcher. The right number of the themes can vary depending also on the size of the data. With concepts the size of the grey concept dot reflects its connectivity in the concept map. The larger the concept dot is the more often the concept is coded in the text with other concepts in the map. The themes take their names from the most connected concept from each circle. That is why, it is important to examine the concepts of the circles to see if there can be a better descriptive name for the themes. So, what Leximancer does is it searches for context models in the meaning of texts and displays the extracted information visually. (Poser, Guenther and Orlitzky 2012, 424).

It is challenging to categorize the content analysis Leximancer creates purely as a quantitative or a qualitative content analysis. The coding behind the software uses quantitative methods to create the concept map which fits better to the quantitative content analyses that is more focused on counting and measuring. Leximancer is a system which performs many of the steps of the content analysis for the user, but researcher still must define the research question, select the data sample and most importantly make sense of

the final model. And the part in which researcher is interpreted and tries to understand the visual presentation of the content analysis, has then more qualitative features in it.

Sustainability reports are from public source, made by private organizations which are in this study analyzed objectively and systematically identifying specified characteristics of messages. For this reason, use of the sustainability reports eliminates the potential prescriptive element that could develop in use of for example survey or interview. Krippendorff (2004, 19) articulates that replicability is the most important form of reliability and he defines that content analysis is replicable because the objective and systematic nature of it. Compared to other analysis techniques such as interviews content analysis is unobtrusive method, which means that usually neither the sender nor the receiver of the message is aware of the message being analyzed. Because of that, there is no danger that measurement will itself act as a force for change that could confound the data. According to Sotiriadou, Brouwers and Le (2014, 220) Leximancer is a suitable tool when a researcher is exploring the textual data to attempt to uncover important factors and when the researcher does not have set of factors or a model set beforehand.

5.3 Research process

The research process started in September 2020 and continued until December 2020. The process composed of four steps that are presented in the figure 3. First step of the process was to collect the sustainability reports. After that there was a need to choose the software used for the content analysis. Leximancer was chosen to be used for the analysis. The second step was to upload the collected sustainability report files to Leximancer. At this stage it was noticed that there were few files that were in format in which Leximancer could not read the text from the files. Those files were changed to a better fitting format. After all the material was successfully uploaded to Leximancer the first model of the content analysis was build.

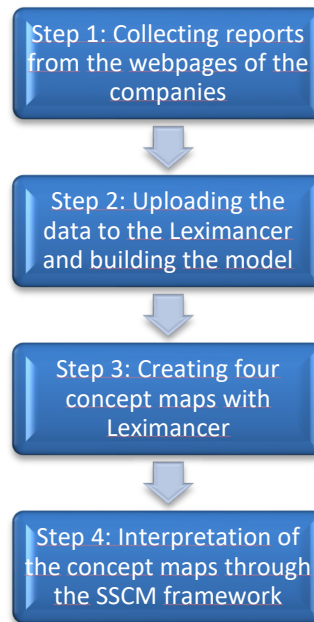


Figure 3. The steps of the research process

At this point it was noticed that some adjusting was needed to build a coherent model. There was a need to adjust the percentage of Name-Like Concepts to zero in the Concept Seeds Settings. The company names would have been useful information if the purpose was to observe differences between companies but now the focus is instead to analyze the reporting of the industry. In the Text Processing Settings few words were added to the stop-list, which includes stop-words; words that are programmed to be ignored since they are deemed irrelevant for searching purposes because they occur frequently. The stop-list contained to start with the most common irrelevant words like and, or, is etc. The words added to list were the firm names with small letters (names starting with capital letter are automatically identified as names); *storaenso*, *altri* and *metsä*. Also, the words *million* and *page/pages* were added to the stop-list because those did not add any value for the analysis as concepts.

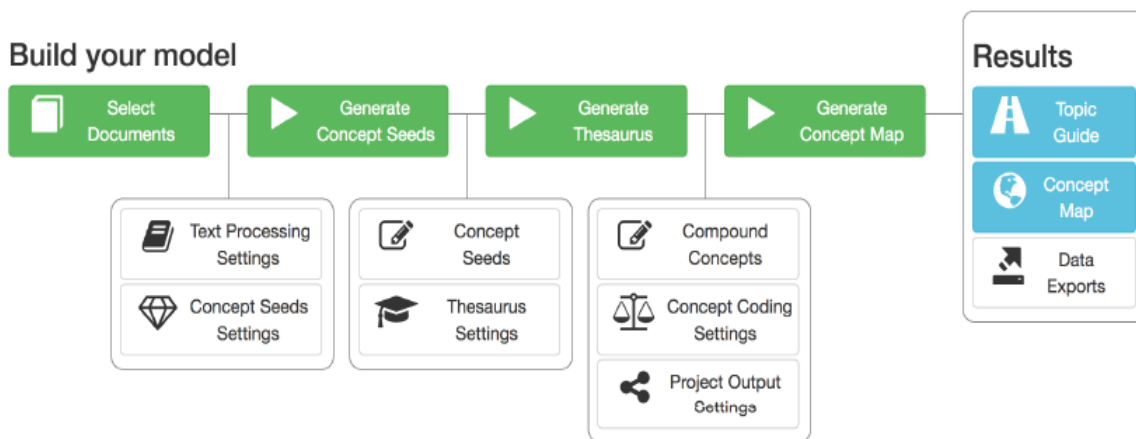


Figure 4. The Leximancer analysis model

The third step was to create the first concept map from all collected reports from 2010 to 2019. Even though the names of the companies written with small letters were added to the stop-list, there was still letter shortens of company names (upm and sca) which were still added to the stop word list because they were not relevant while trying to analyze the content of the reports due to their low content meaning. After that change, there were no more company names in the concepts or themes.

The first analysis with all the reports between 2010-2019, was done by using the folder tags, which able the tracking of the data of each reporting year. The folder tags were added in the Text Processing Settings. The tags are added in the concept map same way as the concept are there, close to the concept they are occurring close by in the text. They are presented in the map as grey dots with red colour title.

After doing the first analyses with the whole data for the full observation period, additional concept maps were still formulated from the reports from three different observation points which were years: 2010, 2014 and 2019. These separate observation point concept maps, were done because the concept map with tags from every year only presented indicative image of the changes in the reports. While making completely own concept maps from the three observation points made it easier to perceive the development of the sustainability reporting through the similarities and differences of the concept maps. These three maps were build with the same of process as the first but just only selecting the data only from the examined year in question. For this part, there was no need to use the tags.

The fourth and the last step was to interpret the concept maps created with the Leximancer. This was done by examining the content of the concept maps through the SSCM framework established in the chapter 2.

6 RESULTS

This section presents the visual results of the analysis performed with Leximancer, including the concept maps and the synopsis of the sustainability reports. The section also includes comparison of the differences and similarities between the concept maps. First the chapter 6.1 presents the analysis of the data from the whole observing period from 2010 to 2019. The first analysis presents an overview of the sustainability reporting and show positions for each year with the folder tags. The following chapters 6.2-6.4 present the analyses from three observations points from every 5th year. Through comparing the three consecutive concept maps, the goal is to grasp the temporal development of the sustainability reporting within the pulp and paper industry.

6.1 Concept map 2010-2019

Figure 5 shows an overview of the themes in sustainability reports from the past decade. Eight themes emerge as the core elements of the concept map. As shown in the synopsis chart, *production* is the largest one. The biggest concepts of this theme are production, energy, products, emissions and materials. As can be seen from the chart below a theme called *management* is the second largest theme of the concept map. There the biggest concepts are management, business, group, environmental and data. The third largest theme in the concept map is titled as *forest*. In this theme the biggest concepts are forest, sustainable, forests, climate and biodiversity. As shown in the synopsis chart in figure 6 *employees* is the fourth largest theme. This theme consists of six concepts only. Those concepts are employees, safety, work, board, hours and number. The result indicates that the object companies report similar ways what comes to employees and their safety, working hours and number of employees. The next largest theme was originally named by Leximancer as total. This theme name did not feel quite fitting to describe the theme. Total does give the sense of relating to numerical things and when examining the other concepts of the theme: water, waste, number, rate, systems, personnel and finland. Therefore, it was decided to be renamed as *numerical reporting subject*. The sixth theme is called *sustainability* and the biggest concepts of this theme are sustainability, report, reporting, assurance, group and social. The seventh theme is *fsc*, which stands for Forest Stewardship Council and this organization also promotes responsible management of the

world's forests and has the FSC certification program. In this theme the most common concepts are

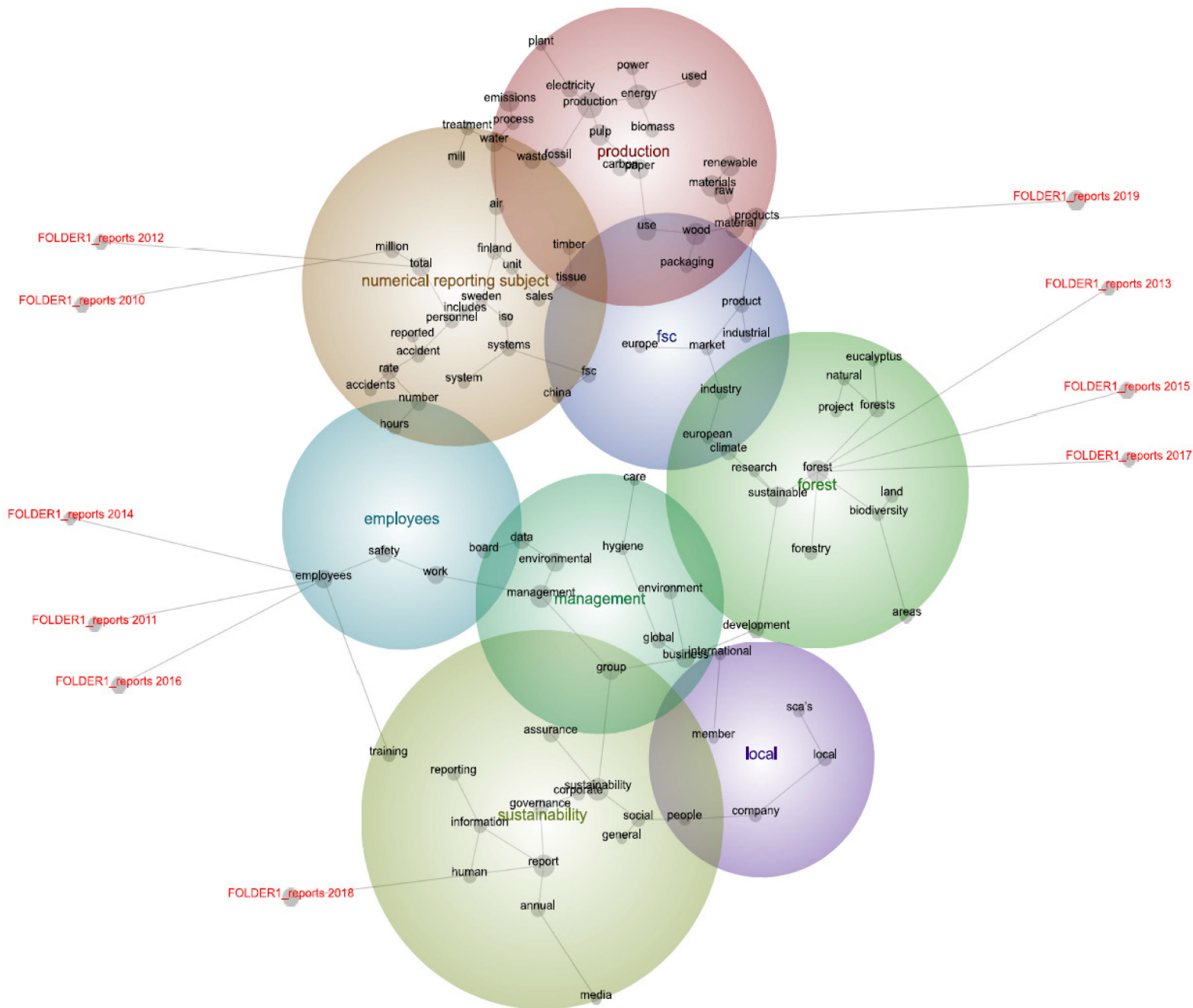


Figure 5. Concept map of the years 2010-2019.

fsc, wood, product, market and industry. Finally, the eighth and the smallest theme is labelled as *local*. The biggest concepts in the local theme are local, company and people.

The figure 5 also presents the yearly tags in red text showing where the Leximancer places each folder in the concept map. As an overview it seems that there are more earlier year tags on the upper left side of the concept map and, in contrary, later year tags more on the right side of the map. But when trying to interpret the differences between different

years according to the year tags the construction is not that clear. From this concept map it is hard to analyze what effects on each year's position. No distinct progression can be observed from the tags of the concept map. For this reason, it is rational to observe and compare different years with yearly concept maps to gain some understanding of the development of the reporting.

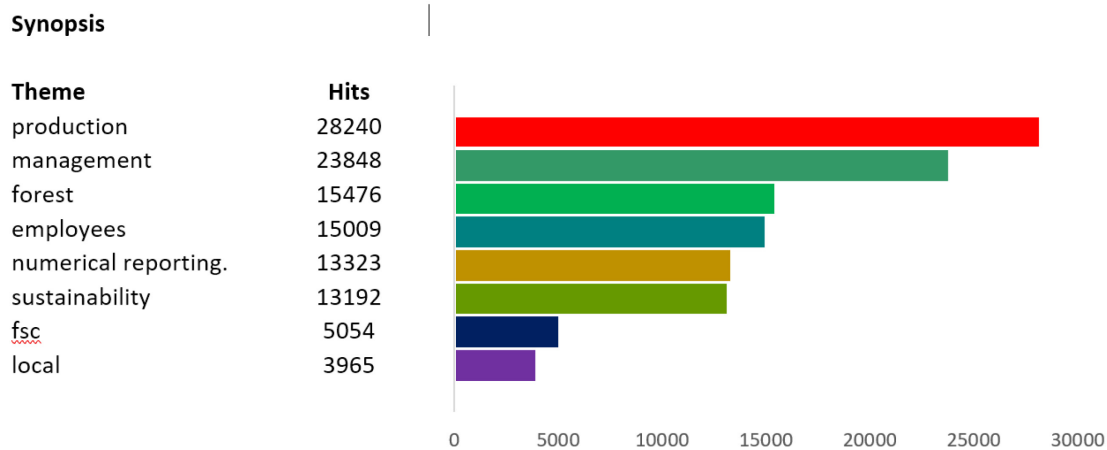


Figure 6. Synopsis chart 2010-2019.

When observing the whole examination period, many of the supply chain operations are present in some ways, for example *production* theme matches to production functions, sourcing related sustainability aspects are part of *forest* theme, *fsc* theme has connections to product design, and waste and renewable concepts are linked to end-of-life function. But the distribution part including logistics, warehousing and transportation are missing from the concept map. So according to the Leximancer analysis it does not stand out as essential concept in the data.

6.2 Concept map 2010

Figure 7 presents the concept map of sustainability reports from the beginning of the observation period. As shown in Figure 7 there are twelve emerging themes in the concept map. From the concept map and the synopsis chart in figure 8 we can see that there are several small themes like *mill*, *global*, *use* and *programme*. These themes include a limited number of concepts, which makes them somewhat unconnected in the concept map and hard to interpret. As a response, it was also tested to change the theme size in the Leximancer to create fewer themes but the outcome was that the bigger themes were

merging whereas the smaller themes persisted in the concept map. Hence the theme size was left to be in the default size.

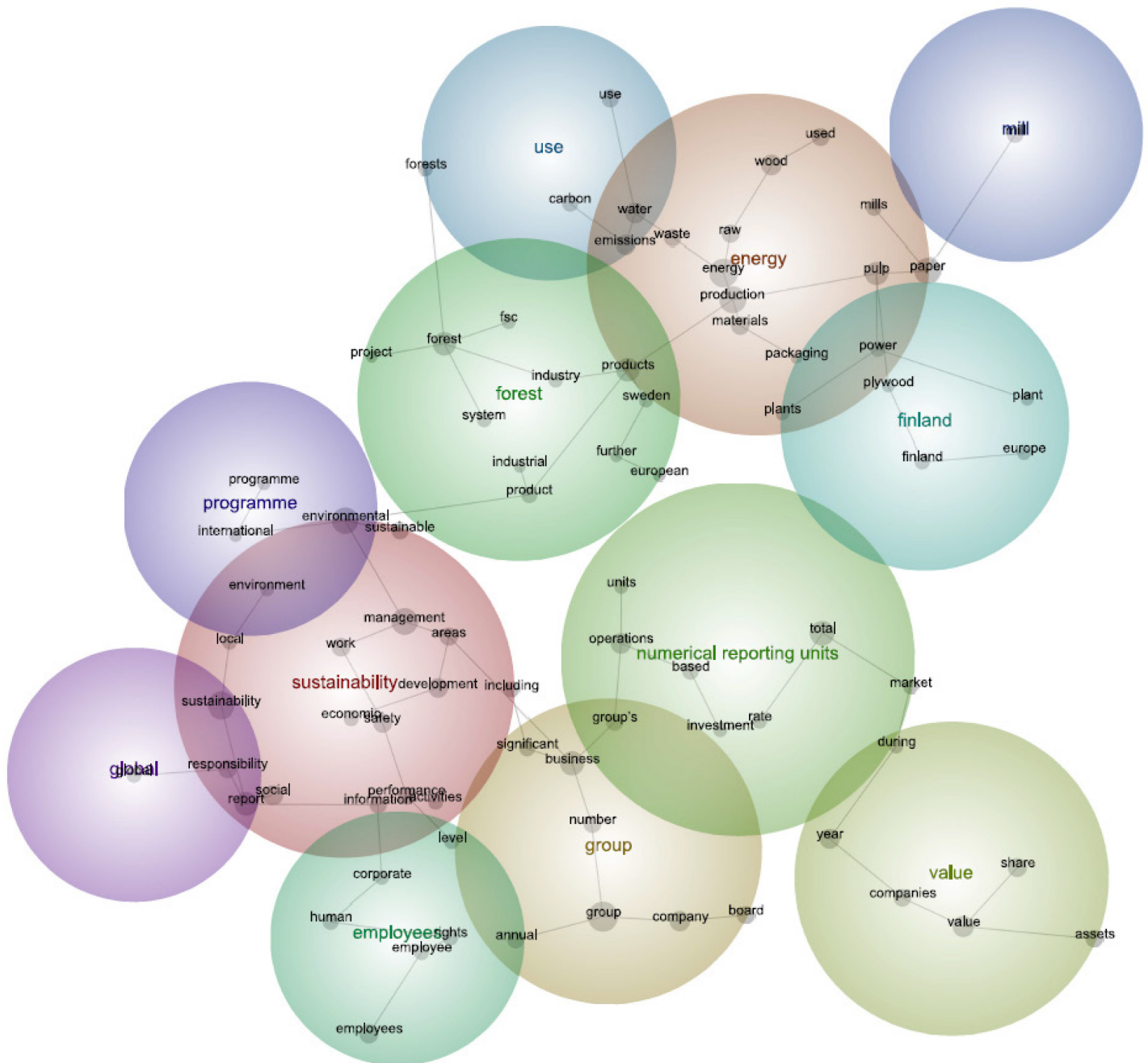


Figure 7. Concept map 2010.

The concept map in figure 7 shows that *energy* is the most important theme in the reports from the beginning of the observation period in 2010. In the concept map of reports from 2010 the energy theme includes concepts like energy, waste, water, emissions, carbon, materials, mills, wood and plants. Closer inspection of this theme shows that energy theme is similar to the production theme in the first concept map in figure 5 from

the whole data. The difference between these two themes seems to be that energy is more connected concept than production in 2010 and that is why the theme is named *energy* not *production*. Further comparison of these themes also shows that the theme consists of lower number of concepts in year 2010 findings. For example, concepts like fossil, electricity, biomass, renewable, use, raw and material are not part of the energy theme in 2010.

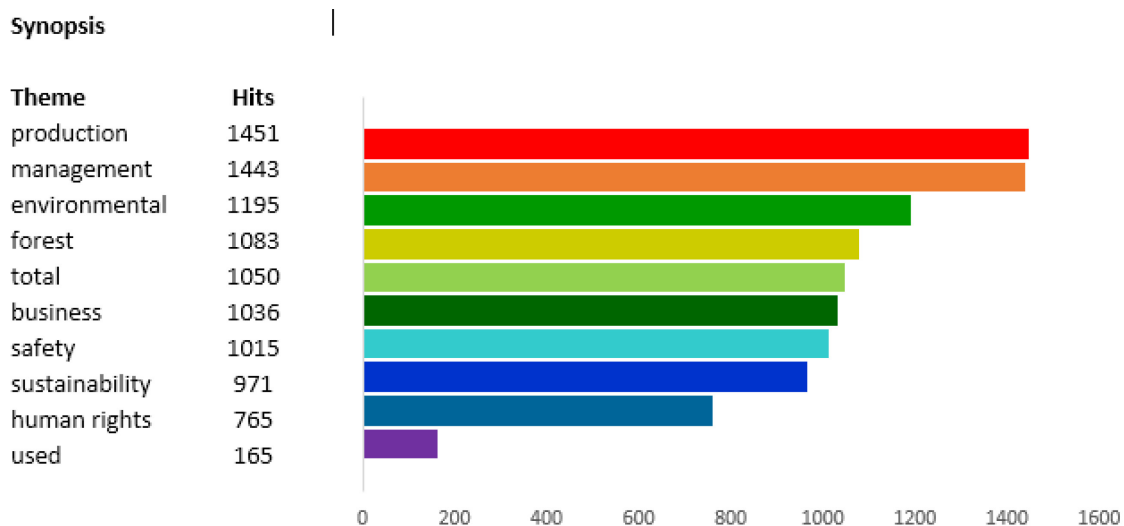


Figure 8. Synopsis chart 2010.

As the synopsis chart shows, theme called *sustainability* is almost as big theme as the energy. If comparing the sustainability theme of 2010 to the themes in the 2010-2019 concept map it seems to be constructed to a great extent of the sustainability and management themes of the 2010-2019 concept map. From the concept map, it can be seen that also concepts work and safety are part of the sustainability theme, instead of the employee theme. Interestingly the forest theme is the sixth biggest theme in 2010, indicating a lower significance of the theme that year compared to the full observation period. Furthermore, what stands out in the *forest* theme is that it seems to include also some of the *fsc* theme concepts from the 2010-2019 concept map but otherwise there are no concepts that would indicate anything about protection of forests, climate or biodiversity. Another noted thing was that in the 2010 concept map *employee* theme at this point included also human and rights concepts. The fourth biggest theme is titled as *value* but, interestingly, this theme does not appear in the 2010-2019 concept map at all.

A closer examination of the 2010 concept map also shows that, the theme titled as *finland* has same concepts as the *reporting subjects* theme in the 2010-2019. It seems like this theme has later merged to be part of the numerical reporting theme. The synopsis

chart above shows that a theme called *group* is the third biggest theme in 2010. When examining the theme and its concepts, this theme seems to merge to be part of a bigger management theme later.

6.3 Concept map 2014

The next concept map in figure 9 present the Leximancer analysis of reports from the second observation point, year 2014. As shown in the figure 9 below there are ten themes in this concept map which is two less than in 2010. When looking at the 2014 concept map it shows that two almost equally large themes emerge as the biggest ones: *production* and *management*. The latter includes concepts like management, work, environmental, operations, supply, chain, number and group. When compared to the 2010-2019 concept map, it appears that there are same concepts included in the *management* and *employees* themes. A closer inspection of the concept maps shows that supply, chain and operations concepts are new concepts that did not appear in the 2010 concept map. This finding indicates that supply chain and operations management have become more significant concepts in the sustainability reporting by year 2014.

Synopsis chart shows that *production* is still the largest theme in 2014. Now the production concept has become more central than energy within the theme. Comparison of the 2010 and 2014 concept maps shows that theme *use* in the 2010 concept map has now merged to be part of the production theme. We can also observe from the concept maps how fossil is a new concept in the *production* theme. Closer inspection of the concept map also shows how concepts connected to raw materials are no longer part of the *production* theme. Instead, they are now part of the *forest* theme. Like mentioned earlier, the

raw materials concepts are now included in the *forest* theme together with product concepts. New concepts within this theme include climate and biodiversity as presented in the figure 9.

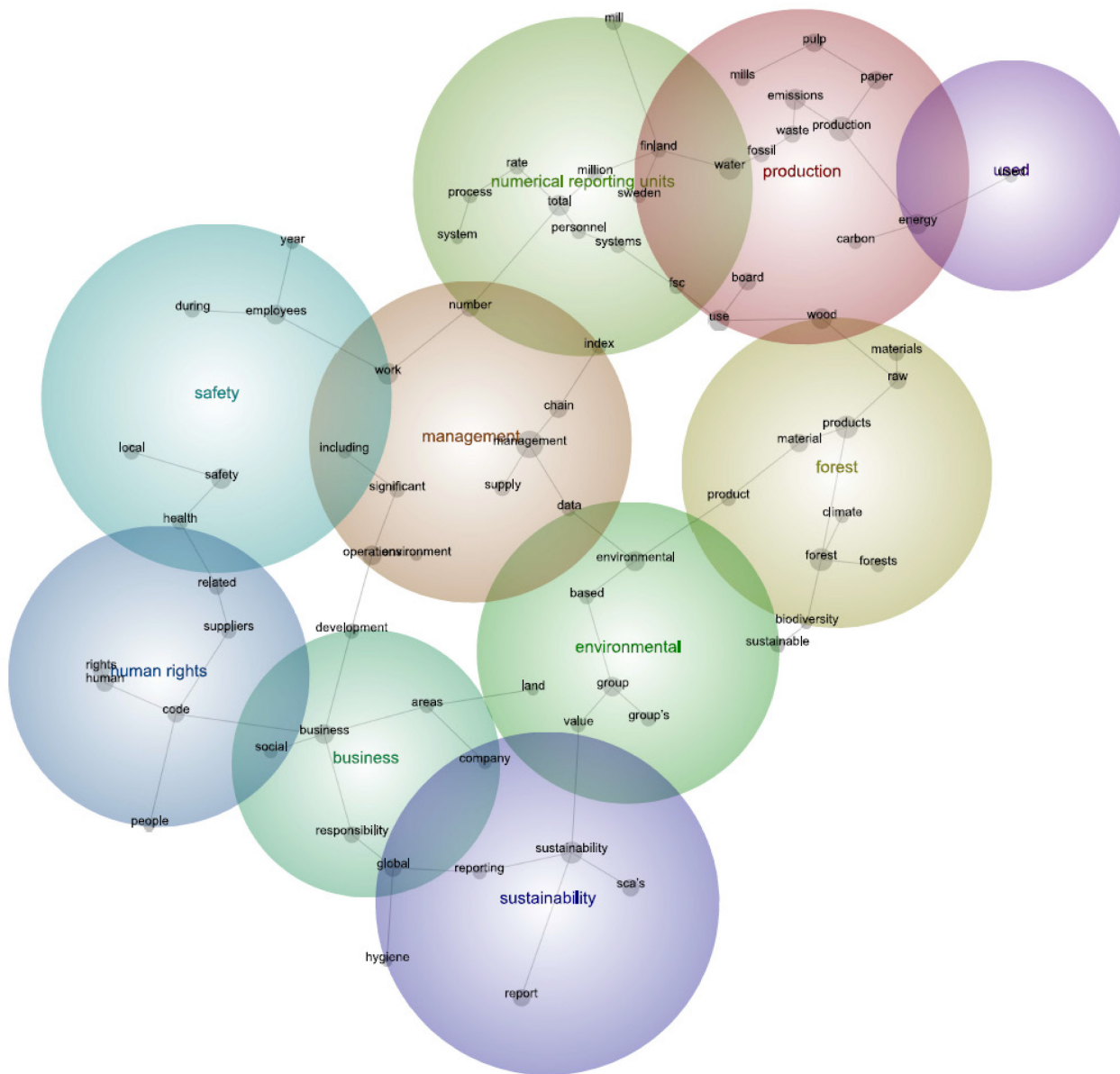


Figure 9. Concept map 2014.

The *numerical reporting units* theme in the concept map shows that fsc concept has now moved to this theme from the previous forest theme. Also, the finland concept has moved to *numerical reporting units* theme. The theme is the fifth largest theme in year 2014 as shown in the synopsis chart, so it has stayed in the same place as in year 2010. Interestingly *environmental* is the third largest theme in 2014. Group related concepts, that were own theme in 2010, now seem to part of this theme. Another new theme emerging in the concept map is the *business* theme. Business concept was in 2010 concept map part of the group theme. Concepts like social, responsibility, global and areas are part of

this theme. A third new theme in the 2014 concept map is *human rights*. Concepts in this theme include human, rights, code, people, social, suppliers and related. In the 2010 concept map, human and rights concepts were part of the employee theme. This result indicates that human rights and social issues are now increasingly seen as relating to the suppliers and supplier management rather than organization's own employees.

Synopsis chart shows that *sustainability* is the eight largest theme in year 2014. So, it is significantly smaller theme than in year 2010. However, it looks like the *sustainability* theme of the 2010 concept map has divided in two themes in 2014 – the sustainability theme in figure 9 includes now mainly the concepts like sustainability, report and reports and a new theme labelled as *safety*, emerges. This theme includes concepts safety and local that used to be part of sustainability theme in 2010. Other concepts of the *safety* theme are employee, year, during, work and including. So interestingly there is no employee theme in the 2014 concept map. Lastly, as can be seen from the synopsis chart, there is the smallest theme called *used*, which is a one concept theme. When compared to the 2010 synopsis chart and concept map, a lot less of these small themes can be observed. The result suggest that the content of the sustainability reports might have developed into a more uniform format.

Synopsis

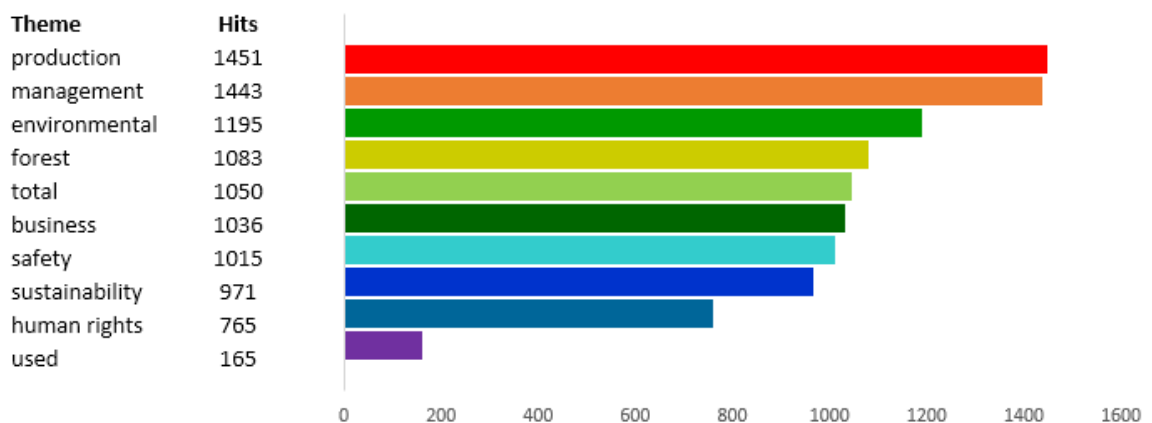


Figure 10. Synopsis chart 2014.

6.4 Concept map 2019

The latest observation point of the analysis is in year 2019. Figure 11 shows that in the 2019 concept map there are eleven themes at – which is one more than in the year 2014 map. There are no more one concept themes but as can be seen from the synopsis chart, the five smallest themes are significantly smaller than the six biggest themes. The synopsis chart also shows that for the first time, *production* is no longer the biggest theme. The *forest* theme is now emerging as the biggest theme in year 2019 sustainability reports. When compared to the 2014 concept map, it seems that the *management* theme has merged to be part of the *forest* theme. Closer inspection of the concept map shows that also the fsc concept is now part of the forest theme. Interestingly a new theme in 2019 is *forests* theme. It is the fifth biggest theme in the concept map. It includes following concepts: forests, land, growth, natural, change, global, material and wood. The fact that there are two forest related big themes in the 2019 concept map signals that forests have become a considerably more reported topic in the sustainability reports towards the end ten year observation period.

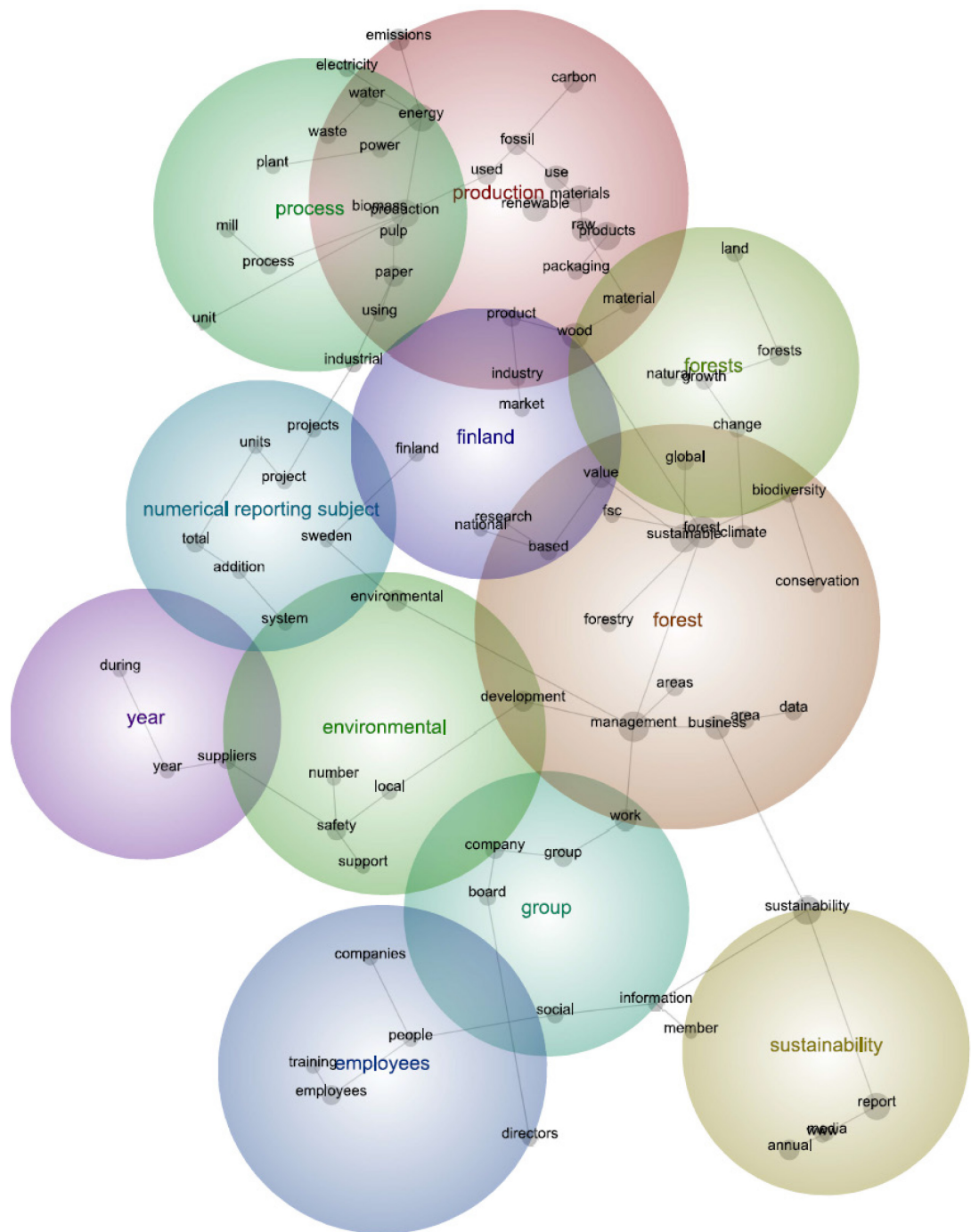


Figure 11. Concept map 2019.

Even though production is no more the biggest theme in 2019, it still has maintained a strong position as the second biggest theme. When compared to the 2014 concept map, product concept has moved from the *forest* theme to the *production* theme. Another observation was that there is a new theme called *process*, which seems to position very close to production theme and there are some concepts like plant and electricity that are part of

the production theme in the 2010-2019 concept map that are now part of the process theme.

Surprisingly, human and rights concepts no longer exist in the 2019 concept map. In the 2014 concept map there was still *human rights* theme but now neither of the concepts can be found from the concept map. This observation is unexpected because the social aspect of the reporting would be expected to gain more importance when the reporting has expanded from environmental reporting to sustainability reporting. Another interesting observation is that the *sustainability* theme is the third biggest theme in the synopsis chart. The *sustainability* theme only has six concepts: sustainability, report, annual, media, www and member. Other bigger themes have a lot more concepts. This might indicate that the concepts of the sustainability theme are reported quite similarly in the reports. If we now turn to observe the changes in the sustainability theme from the 2014 concept map, we can see that the global concept has moved from the sustainability theme to forest and forests themes.

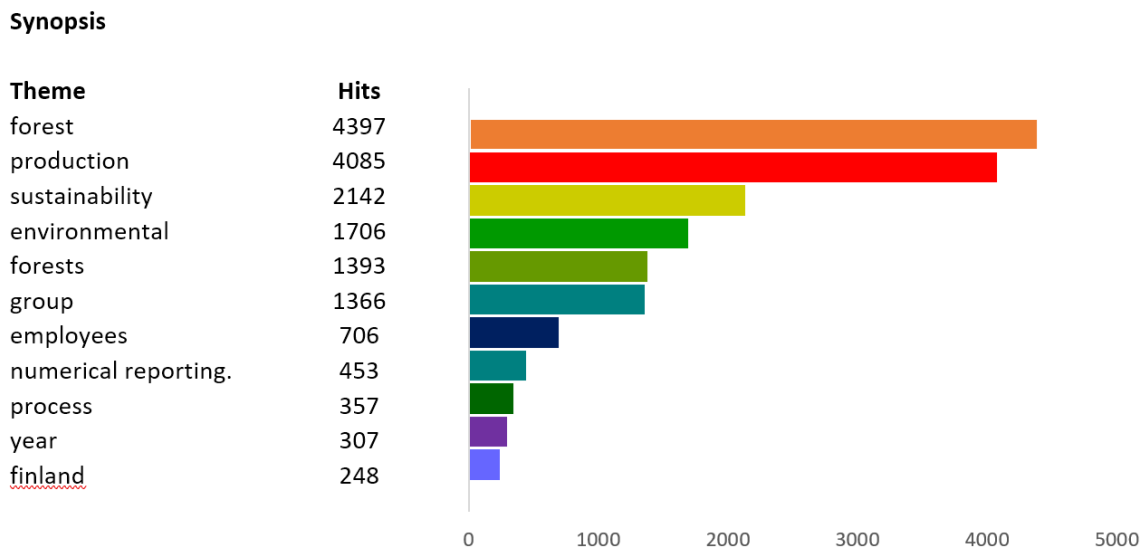


Figure 12. Synopsis chart 2019.

The fourth biggest theme is called *environmental*. Interestingly the *safety* theme from the 2014 concept map seems to have merged to part of the environmental theme. In the 2014 map the safety concept was connected to health concept and in the 2010 concept map to work concept. So, it might suggest that environmental safety has become a more popular sustainability reporting subject than work and health related safety. Group theme also seems to make a reappearance in the 2019 concept map. In the 2014 concept map the

group related concepts were part of the *environmental* theme. New concepts in the *group* theme are social and information.

Employees is another theme that returns as an independent theme in the 2019 concept map. New concept in this theme is training. When observing the numerical reporting subject theme, two new concepts can be observed: project and projects. Compared to the 2014 concept map, rate, fsc and personnel concepts are no longer part of the *numerical reporting subject* theme in year 2019, which might explain why the theme has decreased during the five-year observation period. The two smallest themes are *year* and *finland*. The *year* theme consists of the year, during and supplier concepts. The theme seems to be about supplier monitoring during the year. Lastly the *finland* theme consist of finland, value, industry and market concepts. The most distinctive commonality seems to be market.

7 DISCUSSION

As mentioned in the literature review sustainability reporting is still a young field compared to financial reporting. That makes studying the content of sustainability reports interesting. Particularly interesting is temporal development of reporting content, i.e. tracking the changes that have happened during the last decade. This study was set out with the aim to identify themes appearing in sustainability reports of major pulp and paper industry companies. This chapter discusses the findings presented in previous chapter in light of the extant literature (chapters 2-4). First subchapter 7.1. discusses the themes that were found in the content analysis. Chapter 7.2 discusses the results through the SSCM framework presented in chapter 2.2. The second aim of this study was to evaluate the development sustainability reporting during the ten-year observation period. This aim is discussed in the chapter 7.3. Lastly the chapter 7.3 discusses the evaluation of the study.

7.1 Themes of the sustainability reports

The first objective was to identify themes appearing in the sustainability reports. In this study, eight different themes were found when observing the whole data. The identified themes are: 1) *production*, 2) *management*, 3) *forest*, 4) *employees*, 5) *sustainability*, 6) *numerical reporting subject*, 7) *fsc* and 8) *local*. From the concept maps of Chapter 6 can be seen that the concept map of the whole data from the full observation period 2010-2019 is the clearest one. The themes of figure 5 concept map are more distinct than those of the other maps. There are no one-concept themes in the 2010-2019 concept map. There is also the smallest number of themes compared to the individual year maps. This result is quite expected. The data set of the 2010-2019 concept map is lot bigger than when observing reports of a single year, which naturally explains why the Leximancer managed to get a better understanding of the concepts that are forming the themes.

The most obvious finding to emerge from the analysis is that production was the biggest theme in sustainability reports in pulp and paper industry. This result is consistent with Mäkelä's (2020) finding which showed that own production is extensively reported in what comes to environmental reporting among the forest companies. The strong role of production is most likely explained by the history of pulp and paper industry. In the past the industry has been causing high amounts of pollutions and contaminating nature but the industry have been achieving big improvements in decreasing the pollution caused by the pulp and paper production.

Management was the second largest theme. It included environmental related concepts as well as business and group related concepts. Forest was the third largest theme. Other quite similar size themes were employees, numerical reporting subjects and sustainability. The two significantly smaller themes were fsc and local. The findings imply that environmental reporting is more extensive than social reporting. Another important finding is that sustainability is one of the themes. As mentioned in the key concepts and in the sustainability reporting chapter, the way these non-financial information reports have been called vary over time. As the sustainability arises as one of the themes in the concept map, it can therefore be assumed that during this observation period the sustainability reporting has been the dominant way of reporting. In the future investigations it might be interesting to track if this will change and if some new trends like integrated reporting will take place as a main reporting style.

7.2 Reporting through SSCM framework

The literature review revealed how relatively little is known about how supply chains' sustainability is acknowledged in the sustainability reporting. The purpose of this study was to explore the sustainability reporting from the supply chain perspective and for that reason the results should be assessed through that perspective. As mentioned in the literature review, there are five functions that form the sustainable supply chain. Those functions are product design, sourcing, production, distribution and end-of-life. Very little was found from the literature about the examination of those functions in sustainability reporting. In the supply chain management literature one of the key ideas is to optimize the whole supply chain not just parts of it. It can thus be suggested that similarly in sustainable supply chain management the whole supply chain should be considered when optimizing the chain sustainability. That makes it interesting to observe the results of the last chapter through linking the themes and concepts to the SSCM framework and those five functions. Because there are only few themes that can be straightforwardly connected to these functions, the inspection level was extended to concept level. Concepts related to each function are presented in the table below. Few of the concepts had meanings in two different functions. For example, fsc was mentioned as a certification needed for raw mate-

rials but also as standards needed for own produced products and for that reason the concept is listed both in product design and sourcing categories. Also waste concept was placed both in production and end-of-life categories because it was used in reports as reporting the waste water levels which is part of reporting emissions of the production, and waste as garbage that needs to be handled which is more about reporting the end-of-life waste management.

Table 2. Concepts related to supply chain functions.

Supply chain function	Concepts related to the function
Product design	Product, packaging, material, fsc, raw
Sourcing	Suppliers, forestry, forests, forest, biodiversity, land, climate, fsc, human, rights, code, conservation
Production	Production, energy, used, power, biomass, electricity, fossil, emissions, water, waste, plant, pulp, carbon, paper, wood, raw, material, employees, safety, biomass, process, training
Distribution	
End-of-life	Waste, renewable

Prior studies that have noted the importance of product design function highlighted that a significant amount of products' environmental impacts is determined at the design phase. Even though the product design can have such a strong impact, the product design seemed to have relatively small role in all of the concept maps. Product, packaging, fsc, raw and material concepts are all present in all of the concept maps excluding packaging

in the 2014 concept map. These findings show that there is room for more comprehensive reporting in product design sustainability. It might be that the product design function is less reported because not all firms are yet proactively orientated with the sustainability issues, and for that reason are investing less resources to this function.

Sourcing function related concepts are strongly presented in forest theme focusing on the environmental sustainability of the wood raw material. There are also few concepts that are more related to the social side of sustainable sourcing (human, rights and code). In the year 2014 concept map human rights have shifted from the employee related position to supplier related position but like mentioned earlier, the human rights related concept no longer exist in the 2019 concept map. Sourcing related information in the reports has been increasing during the ten-year observation period when information about sustainable forest management has clearly grown, while in the 2019 concept map forest is the biggest theme. This finding is contradiction to what Mäkelä (2020) found, i.e., that other functions than own production needs more focus. A possible explanation for this might be that production is still the only function in which the disclosures are supported by numerical information and the sustainability information of the sourcing is more general creating less accountability. This might be due to informational visibility problems in supply chains. Supplier firms do not share their sustainability information for the focal companies. Busse et al. (2016, 19) discuss about the limited visibility in upstream and downstream supply chains and how it is many times related to practical difficulties.

Production related concepts are mostly part of the production theme. There are also few concepts related to employee safety and healthy that are related to the social side of production. The production theme had strong position as a large theme during the whole observation period. The results showed that some new concepts like *biomass*, *fossil* and *carbon* emerge during the observation period. These changes may be explained by people's increasing awareness of the climate change which might have created a need to report more thoroughly about the use of fossil fuels, carbon footprint and energy or heat production through biomass material. As mentioned already earlier, production having a strong role in the sustainability reporting in pulp and paper industry is in line with Mäkelä's (2020) study that emphasizes how reporting of production has been dominating the environmental reporting of forest companies. But here we could see that the strong role persisted through the observation period even though the year 2019 concept map shows that production was no longer the biggest theme.

Another important finding was that none of the concept maps included any concepts or themes related to distribution. This finding is rather disappointing. As mentioned in the literature there are several factors in the field of warehousing, logistics network, distribution channels and vehicle choices that should be paid attention to in sustainable distribution. It can be that there are companies in the data that do report something related to sustainable distribution in their sustainability report but the fact that there are no concepts related this function strongly indicates that, the subject should be covered better in the reporting. It is unlikely that for example transportation would be only a small or trivial function in the paper and pulp supply chains because in Finland forest companies have brought up worries concerning possible tax increases for the petrol that would have big impacts for the profitability of the industry. One possible explanation to the findings is that due to a strong focus on the financial aspect of distribution, both the environmental and social dimensions of distribution are neglected in reporting.

The end-of-life function is the last function of the SSCM framework. In the production theme there was the *waste* concept which was used also for reporting on hazardous waste and waste send to landfill besides the waste water. Also, *renewable* concept in the production theme can be interpreted as being related with material recycling. It is somewhat surprising that the end-of-life function had this small contribution to the sustainability reporting when considering how much bioeconomy and circular economy concepts are discussed in the forest industry. Even though there are two concepts related to end-of-life function, it seems like also this function would have lot of potential to grow into a more comprehensive topic in the sustainability reporting. Another interesting finding was that the *renewable* concept appeared first time in the 2019 concept map, which might be a signal that this function is starting to gain more interest and might be growing in the future.

7.3 Development of sustainability reporting in pulp and paper sector

As mentioned in the literature review, according to the KPMG's surveys in global scope forest and paper industry's sustainability reporting activity peaked back in 2011 when it was 84 %. The data gathered for this study shows that sustainability reporting rate had risen during the observation period 2010-2019. Clearly, this finding is contrary to the KPMG survey results. These results indicate that the development of sustainability re-

porting in Europe have not been in sync with the global development. A possible explanation for this observation may be the implementation of the EU's Non-financial Information reporting directive in 2018, that might have forced companies to start sustainability reporting within the EU region. What is surprising is that the average length of the sustainability reports was growing at first but in the last few years the direction has been towards slightly shorter reports. The reason for this is not clear but it might have something to do with companies wanting to clarify the content of the sustainability reports. There is a limit how much report's content can be expanded before it will start to disturb the user of the report. Also, the new GRI instructions guide the organizations to focus on reporting on things that are actually substantial for the organization.

KPMG's survey from 2020 shows that forest and paper industry has the second highest rate of reporting about biodiversity risk off all the industries. In this study, reporting about biodiversity seems to become more popular during the observation period because the *biodiversity* concept appeared first time in the year 2014 concept map and it was also part of the forest theme in the 2019 concept map. Also, climate concept appeared as a new concept in the maps during the observation period. These findings suggest that sustainability reporting about environmental issues have expanded during the decade.

Several studies have found that the sustainability reporting in the forest industry is focused on environmental reporting (Sinclair & Walton 2003; Li et al. 2010). The results of this study indicate similar emphasis on environmental topics. There are some concepts relating on human rights, employee safety and training along with local communities that refer to social issues disclosed in the reporting. However, compared to environment related concepts the social concepts present a minority. One unanticipated finding was that human rights related concepts were missing from the 2019 concept map. It is difficult to explain this result, but it might be related to the fact that climate change and declining nature's biodiversity have caught the attention of public conversation in the media, which in turn could have left social issues unheeded.

When observing the whole examination period, many of the supply chain operations are present in someway but the distribution part including logistics, warehousing and transportation seems to be missing. So according to the Leximancer analysis it does not stand out as an essential concept in the data.

7.4 Evaluation of the study

Discussion on the reliability of the findings is also important. Reliable research aims to minimize the errors and biases in a study. Research techniques used are expected to be reliable and they should result in findings that are replicable (Krippendorff 2004, 18). First of all, a note of caution is needed here since computer aided content analysis can create transparency issues for the methodology. The coding of the Leximancer software is ultimately a black-box to the user, meaning that the user can not know exactly how the software processes the information, which makes it difficult to assess the results for possible errors. For this reason, also the manual modifications of the process in the software were kept minor to obtain more reliable results. Even though the analysis process cannot be published in a code format so that the research could be directly repeated, still the different stages of the analysis are described in such detail level in chapter 5, that if wanted, it would be possible to somebody else to repeat the study.

Another source of uncertainty is the fact there were less companies reporting in the start of the reporting period. This means that less reports were available in the year 2010 and 2014 data than in year 2019 data. Also, for some companies the length of the reports was significantly shorter for the first two observation points (years 2010 and 2014), which increases the weight of those companies' reports that contained more information already back then. So, it is possible that some companies and their reports are "overly-presented" in the findings. But it is hard to estimate how big of an impact this might cause since we also know from earlier studies that the early adopters tend to be mimicked by the later adopters on what comes to the content of the sustainability reports. The best practices established by those early adopters can be creating trends which others will follow in their reporting.

Validity of the findings is important topic of discussion as well. Generalizability is not the most important goal in qualitative research, but it is still good to consider what kind of conclusions can be done based on the results. External validity can be considered through two different viewpoints – representativeness of sample and transferability of findings to other contexts. Representativeness of sample refers to how well the sample represents the population. In this study, the sample was 10 companies out of 45 listed companies of "paper product" industry. The sample size is fairly large compared to the population. In the process of collecting the sustainability reports it was also noticed that even out of the ten sample companies, the biggest companies had reported the during the

whole observation period and their reports were more comprehensive, and in contrast smaller companies in the sample usually have started the reporting later or the content of the reporting were more limited. So presumably, a bigger sample might have included more firms with minimal or missing sustainability reporting.

Transferability of findings is discussed here from geographical and industry perspective. When considering, whether the findings of this study can be generalized to other geographic area besides Europe, extreme caution is needed. The geographical location can influence the content of the sustainability reporting, especially the location of the headquarters. Location may affect through legislation and regulations, that usually vary between different countries and economic regions. Also, the maturity of the market and customer demand can also vary between different geographical locations. The KPMG's survey (2020) shows that there are differences in reporting rates between different regions. Transferability is also low when considering the industry perspective. Due to the broad and multidimensional characters of the sustainability concept, companies need to choose what topics they will cover in the sustainability reports based on what is relevant to them. This leads to companies reporting differently based on their industry. It shows also in GRI standards where there are Sector Standards for giving guidance on a sector's most likely impacts. Biggest differences in sustainability reporting are between industrial manufacturing firms and non-industrial sector (Kumar et al. 2015). So, transferability ought to be better between industries that are more similar but there still likely exists features that are industry-specific, like the strong emphasis on reporting about forests in pulp and paper industry.

8 CONCLUSIONS AND FURTHER RESEARCH

This study set out to review the sustainability reporting in pulp and paper industry from the supply chain view. The aim of the research was to examine the themes appearing in the sustainability reports. The second aim of this study was to track the changes and trends in the sustainability reporting during the ten-year observation period.

This study identified eight themes that regularly appear in the sustainability reports of pulp and paper industry. Those themes are: 1) production, 2) management, 3) forest, 4) employees, 5) numerical reporting subject, 6) sustainability, 7) fsc and 8) local. The current data highlight the importance of the production theme. This study confirmed that the role of production has stayed strong in sustainability reports of pulp and paper industry. The research also shows how the sourcing function has increased its popularity as a reporting topic during the ten-year observation period. One of the more significant findings to emerge from this study is that the distribution function has been ignored in the reports. Moreover, the research shows that the sustainability reporting rate has increased among the companies in the data during the observation period. The results of this study confirm that environmental topics have been dominant in the sustainability reports of the pulp and paper industry, which supports the earlier findings of the research field. The findings implicate that the proportions of environmental and social reporting have stayed quite similar during the observation period.

The findings of this thesis provide insights for comprehending concurring themes in the sustainability reporting in pulp and paper industry. The results of this study indicate that from supply chain management perspective, the supply chain functions are covered unevenly in sustainability reports. Further, the evidence from this study suggests that product design, distribution and end-of-life functions would need better coverage in the sustainability reports of pulp and paper industry. Overall, the study strengthens the idea that production function is broadly covered in the reports.

This thesis contributes to the study of SSCM by examining sustainability reporting of the pulp and paper industry specifically from supply chain perspective. The results add new insights both about current state and the development of sustainability reporting for this industry. The present study establishes a SSCM framework for evaluating the roles of different SCM functions. It reveals changes and trends in the sustainability reporting

of the pulp and paper industry. Findings provide valuable insights into the content of those reports from the past decade.

The study has some limitations. The sample covers only 10 pulp and paper industry companies. This is relatively small sample size and might affect in the generalizability of the findings. Even though the study provides useful insights for practitioners and scholars, there is a need for studies that analyze more company reports to deepen the results of this study. Secondly, the fact that study relies only on company reports makes it vulnerable to limitations of that words might speak louder than actions. The actions reported in the reports may not present the actual actions in the organization, which could give a false image of the situation. But that risk is part of sustainability reporting as long as auditing of the sustainability report is not strictly regulated as in financial reporting.

Further research is needed on the progress and development of the sustainability reporting in the pulp and paper industry also in the future. It is expected that sustainability reporting will proceed on evolving rapidly, especially now when the demand for organization's sustainability information seems to be growing. Because the nature of sustainability as a concept seems to change together with spirit of the times it would be interesting to continue research on the topic also in the future as a longitudinal study. Another interesting approach to further research would be to study the themes of sustainability reporting with a larger scope. It could be either a global focus on pulp and paper industry or widening the scope to several industries.

Since this thesis has focused on reviewing sustainability reports' content on a thematic and conceptual level, it might be worthwhile to investigate the reporting content in more detailed level and research also in which kind of context the concept words are presented in the text to gain deeper understanding of the concepts and themes, and to be able to better answer more specific why and how type of questions.

As mentioned earlier, there has been a lack of reporting in distribution topic. There is, therefore, a definite need to cover also sustainable distribution topic in the sustainability reports. Greater efforts are also needed to expand the coverage of product design and end-of-life functions in the reports. More comprehensive sustainability reporting through the supply chain can create many new sustainability opportunities for the pulp and paper companies. The results showed strong emphasis to cover environmental sustainability. Continued efforts are needed to also grow and develop the social part of sustainability reporting in the future. The pulp and paper industry's strong environmental emphasis should not come in the expense of social sustainability.

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