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Implementation of environmental strategies in companies' management and control system

-a study of sustainability reporting in the forest-, paper-, mining- and steel industry in Sweden

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Abstract

Sustainability reporting has grown in importance and transparency over the years. The reporting has in many countries gone from being voluntarily to become mandatory. This is the case within the EU, which adopted the non-financial reporting directive (2014/95/EU) in 2014. Sweden applied the directive in 2017 in the Annual Account Act. At the same time as the requirements have increased research has showed there is a gap between the content of the disclosed reports and companies' actual sustainability activities. To create a reliable and transparent external sustainability report there is a need to take internal activities into account and collect data for reporting from internal management and control systems. Previous research has also recognised that sustainability needs to be a part of the corporate strategy in order to ensure that sustainability becomes a part of the business operations.

In order to contribute to a deeper understanding of any deficiencies between the information provided in sustainability reports and the internal activities the aim of this study is to investigate and explain the implementation of environmental strategies in company's management and controls system. Swedish companies operating in industries with a high environmental impact, the forest-, paper-, mining-, and steel industry, are selected as research objects in this study. A deductive method in combination with a hermeneutic method is applied. Management control systems, corporate sustainability strategy, legal requirements, the Global Reporting Initiative and accounting postulates form the theoretical framework.

The empirical result shows there is a gap between the communicated environmental strategies and the implementation in the company management control system in each of the three industries. The result of the study raises questions regarding what the goal is for the communicated environmental strategies and to what extent the strategies are implemented. Another conclusion is that the companies in the three industries do not comply with the GRI framework, when reporting a limited number of environmental performance indicators. In addition, despite of a mandatory regulation for disclosing of non-financial information and the use of a common framework there is no common reporting standard for companies in the studied industries.

External stakeholders need to have access to relevant non-financial information to assess companies' impact on the environment. Current legislation and standard frameworks provide a high level of flexibility regarding what to report. In order to achieve a common standard this study shows a need to add a conceptual sustainable framework for accounting and reporting, enforcement mechanisms and regulated common standards to achieve a more transparent and reliable reporting practice.

Abbreviations

AAC	Annual Accounting Act
BAT	Best Available Technique
BREF	Best Available Technique Reference
EC	European Commission
EU	European Union
GHG	Greenhouse Gases
GRI	Global Reporting Initiative
LOC	Levers of Control
MCS	Management Control Systems
SMCS	Sustainability Management Control Systems
SDG	Sustainable Development Goals
SET	Sustainable Enterprise Theory
SGU	The Geological Survey of Sweden
TBL	Triple Bottom Line
UN	United Nation

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1 Introduction

The chapter provides a background for introducing the area of study. Following the background, the research context is presented. This section is followed by a discussion of the empirical and theoretical problem and the aim of the study. Finally, the delimitations of the study and the structure of the report is presented.

1.1 Background

There is a growing consensus that companies have environmental and social responsibilities and that good business practices can contribute to achieving a sustainable development (Ditillo & Lisi 2016). A majority of the CEOs worldwide believe that business can play a critical role in contributing to the UN Sustainable Development goals (SDGs) and many companies are implementing sustainability in their organisations in accordance with these goals (United Nations Global Compact, 2019). This indicates that companies have an aim to combine their economic goals with taking responsibility for their impact on the environment and on human beings (Maas, Schaltegger & Crutzen 2016).

Corporate motivation towards sustainability issues is influenced by an increasing internal and external concern for sustainability (Wijethilake 2017). Both internal and external stakeholders request information from companies related to their economic, social and environmental goals. As a consequence, corporate sustainability management needs to handle not only the economic, ecological and social effects of corporate activities, but as well there is a need to provide stakeholders with information about sustainability issues and how they are managed (Hertzig & Schaltegger 2006).

As a result of the higher demand from stakeholders for greater transparency on both environmental and social issues, a growing number of companies are issuing sustainability reports. Important drivers for companies to inform about their sustainability performance are to secure the legitimation of corporate activities, build trust, improve their reputation and gain a competitive advantage (Hertzig & Schaltegger 2006, Sabelfeld 2018). Sustainability reporting provides as well companies an official internal reason to deal with corporate sustainability (Hertzig & Schaltegger 2006). Previous research has shown that the reporting can serve as an internal tool for visualising sustainability issues and corporate responsibility. The reporting can therefore serve as a driving force for establishing and improving the company's sustainability performance (Grahovar 2016).

Sustainability reporting has over the years to a large extent been voluntarily. There is however a trend across countries that voluntary guidelines are shifting to mandatory reporting requirements. This can be seen across various countries like within the EU, US, Japan, South Africa and India. A survey on corporate responsibility reporting, conducted by KPMG in 2017, predicts that frameworks that are voluntary today are likely to become mandatory in the future (KPMG 2017).

The European Commission (EC) adopted in 2014 the non-financial reporting directive, Directive 2014/95/EU, which regulates that large public companies, with over 500 employees, must include non-financial information as part of their submission of the Annual Accounts. The directive requires companies to publish reports regarding implemented policies related to environmental protection, social responsibility, treatment of employees, respect for human rights, anti- corruption bribery and diversity on company boards. In Sweden the Directive was

introduced in December 2016, as a part of the Swedish Account Accounting Act (SFS 1995:1554), and became applicable for the financial year starting in January 2017 for companies with at least 250 employees. The EU Directive 2014/95/EU regulates however only which areas that needs to be included in the sustainability report but not what information is relevant to disclose (European Commission, 2014). The same applies for the Swedish Accounting Legislation. How to report is not regulated, only the areas which is required to report (FAR).

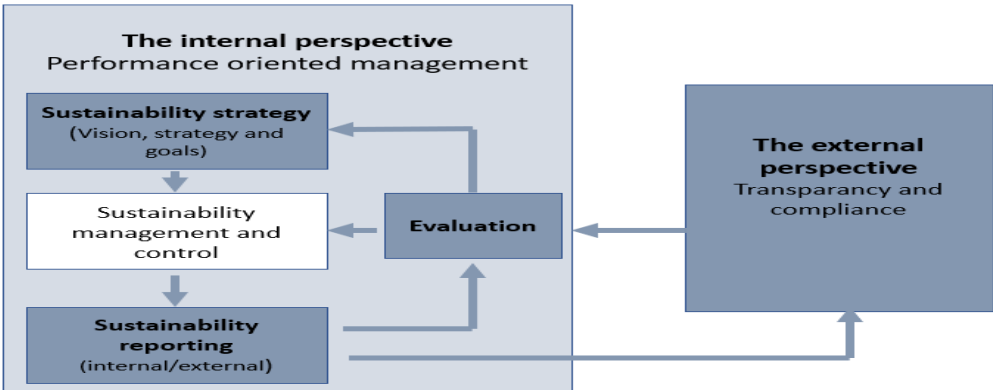
The EC writes in its guidelines on non-financial reporting that companies can rely on highly and broadly recognised international frameworks for reporting. Since the EU directive does not regulate what to include in the reporting much will depend on which reporting frameworks companies choose to adopt. There is today no common standard for reporting and there are several competing frameworks (D’Aquila 2018). The Global Reporting Initiative (GRI) framework holds however a special position and is widely used by companies globally (Milne & Gray 2013, Ingdahl, Carlsson & Pålsson 2015). The majority of the large companies in the world reporting on sustainability use the GRI framework. GRI has become the framework that leads the development of guidelines for how companies report on sustainability (Frostenson, Helin & Sandström 2013).

1.2 Research context

The external pressure from stakeholders is seen as a driver for the increase of sustainability reports. Some argue that external pressure from stakeholders has more impact on how companies act in the area of sustainability than internal goals (Maas, Schaltegger & Crutzen 2016). However, the external demands on the company influence both the external sustainability report and the internal sustainability work. When comparing the external and internal demands one can say that external sustainability reporting focuses on being transparent and to comply with regulations and standards while the internal work priorities the implementation and accomplishments of sustainability strategies (Beusch 2018).

Figure 1. illustrates the external and internal perspective on sustainability reporting in a company, where the external focus is on reporting and the internal focus in on management of sustainability (based on research done by Maas, Schaltegger & Crutzen 2016 and adjusted by Beusch 2018). The boxes marked in dark grey shows areas which is available in sustainability reports. The box for Sustainability management and control is white since it contains internal information not included in sustainability reports.

Figure 1. The internal and external perspective on reporting and sustainability



Source: Developed and adopted from Maas, Schaltegger & Crutzen. (2016) and Beusch (2018)

From an internal perspective the development of sustainability is initially driven by strategies. A control system needs to be in place in order to achieve the strategic targets and goals, and finally, to report the achievements and gaps. The sustainability reports are presented to the external stakeholders in order to communicate how the company deals with social and environmental issues. Based on the provided information in the report stakeholders can give feedback to the company in order for the company to improve.

From an external perspective, on the other hand, the driver of sustainability work arises from stakeholder's expectation on what information should be provided. It requires that the company is transparent in their communication on how it deals with sustainability issues. The stakeholders demand needs to be translated into sustainability strategies, be followed up internally and finally be reported externally (Maas, Schaltegger & Crutzen 2016, Beusch 2018).

Maas, Schaltegger and Crutzen (2016) states in their research that no matter if the perspective is internal or external, when reviewing drivers of company's sustainability work and reporting, corporate sustainability requires integration of the two perspectives. Management of internal performance improvements and external transparency is interdependent of each other in order to improve both sustainability performance and sustainability reporting.

1.3 Empirical problem

As sustainability reporting has grown in importance more information is disclosed and the transparency of the reporting has increased. Despite the increased transparency there is however still a gap between the content of the report and the company's actual sustainability activities (Ingdahl, Carlsson & Pålsson 2015). An example of the gap between the content of sustainability reporting and the company's actual performance is showed in a report from Mistra Center for Sustainable Markets (2019) regarding sustainability communication of the NASDAQ OMX Stockholm Large Cap Index companies 2019. One of the findings was that 88% of the companies communicated to a larger extent about their sustainability ambitions than of their actual work.

The phenomenon of an increased number of sustainability reports and the gap between the content in the reporting and the actual performed activities raise questions regarding the relationship between the external communication and the internal practice of sustainability and the role of sustainability reporting. The increased number of issued sustainability reports in combination with the reporting gap can be interpreted as that sustainability reporting has developed faster than the actual operative sustainability work. From this perspective sustainability reporting might be more of a way to adopt to a practice and create legitimacy rather than actually contributing to sustainability (Ingdahl, Carlsson & Pålsson 2015).

An important point shown in Figure 1. is that data for sustainability reporting needs to come from the same source in order to support both the internal evaluation and the external disclosure (Maas, Schaltegger & Crutzen 2016, Beusch 2018). Previous research has however shown that sustainability reporting is often not driven by what is actually taking place inside the company but is mainly focused on satisfying the external requirements. This means that reporting is done as a separate activity without taking into account the internal activities (Hertzog & Schaltegger 2006). This leads to less transparency in the reporting (Hertzog & Schaltegger 2006) and reduce the possibility for the company's stakeholders to assess what the actual impact is of the company in the sustainability area (Maas, Schaltegger & Crutzen 2016). Previous research has also shown that when the link between the external reporting and the internal ongoing activities is missing companies tend to provide limited quantitative data in the sustainability

reports regarding actions taken to achieve sustainable outcomes (Maas, Schaltegger & Crutzen 2016). Some researchers argue that collecting sustainability performance data for external reporting which is not integrated in internal management and control tools can lead to greenwashing (Milne & Gray 2013). The results of these research raise questions about the lack of management control systems for corporate sustainability within companies.

In order to create corporate credibility and show commitment the sustainability reporting activities themselves have to be credible. External stakeholders do not have the insight to the internal processes and activities so it is up to the company to provide the information in a credible way. This requires that what gets communicated in the sustainability reports and management actions have to be in line with each other (Hertzig & Schaltegger 2006).

1.4 Theoretical problem

Previous research on Swedish companies and sustainability reporting has looked at which role sustainability reporting plays for the internal sustainability work (Ingdahl, Carlsson & Pålsson 2015). In a study of Swedish retailers and their sustainability work one conclusion was that sustainability reporting is used as a communication tool rather than driving internal sustainability activities (Frostenson, Helin & Sandström, 2013). Another study on Swedish publicly owned companies showed that sustainability reporting has assisted in creating new routines and increased the awareness of sustainability inside the companies but the impact on the actual sustainability work is low (Borglund, Frostenson, & Windell 2010).

Stakeholders influence companies' environmental strategies to a varied extent. Rodrigue, Magnan and Boulianne (2013) shows in their research regarding stakeholders' influence on environmental strategies that the main influencers are social stakeholders (governments, communities and employees), financial stakeholders (investors) and industry peers. They have all an interest in the company's environmental impact and its externalities. This interest creates an expectation from stakeholder that companies report their actual environmental impact and takes action in the relevant areas. Since external stakeholders needs to rely on sustainability reports to assess what the actual impact the company has in the sustainability area the information itself needs to be credible (Maas, Schaltegger & Crutzen 2016). Previous research in Sweden has showed a gap between communicated external reporting and actual sustainability activities when doing case studies at companies (Ingdahl, Carlsson & Pålsson 2015). Since external sustainability reports is the tool for external stakeholders to understand and asses the company's environmental impact it is important to understand if the reporting itself reveals this deficiency. There is a gap in the research field in this area and the aim of this study is to contribute to a deeper understanding of any deficiencies between what information is provided in sustainability reports and the internal activities. The focus on the study is limited to the environmental area.

In order to investigate this potential gap this study focus on the communicated environmental strategies and how they are measured and followed up in the sustainability reporting. Previous research has showed that commitment to corporate sustainability requires that sustainability is a part of the corporate strategy in order to ensure that it becomes a part of the business operations (Engert, Rauter & Baumgartner 2016) Also, the GRI framework recognise the importance of sustainability strategy. A requirement in GRI is that companies must include the relationship between sustainability and organisational strategy in the reporting (GRI 101, GRI 102 Global Reporting 2020). In order for strategies to be implemented and be transferred to actual activities there is a need for companies to build up an internal control system with defined performance indicators that can be used to measure and evaluate the outcome. The internal

perspective in Figure 1. illustrates the relationship between strategies, control system and sustainability reporting. Sustainability reports provide information about both the company's communicated environmental strategies and performance measurements and a comparison can be made based on this information. The control system (marked in white in figure 1) is however an unknown area from an external perspective. A credible sustainability report however needs to provide enough information so an external reader can assess the company's actual environmental achievement (Maas, Schaltegger & Crutzen 2016). What can be seen from previous research is that in order to drive real change in the sustainability area there is a need for a correlation between the disclosure of the sustainability report, provided performance measurements and actual performance against defined targets in the strategy (Ahern 2016).

To understand the provided information in the reporting it is also important to analyse how the report has been built up and what the bases is for the reported data. The tool used for this analyse is traditional accounting postulates adjusted for the sustainability area. The framework in traditional financial reporting, the postulates, is the base for how and when accounting should be produced. The postulates act as the basic common understanding when reviewing traditional financial reports. The accounting postulates are going concern, reporting entity, monetary unit and time period. Fagerström, Hartwig and Cunningham (2017) have shown in their research how the traditional accounting postulates, adjusted for sustainability criteria, could act as the standard frame also for sustainability accounting in order to support sustainability reporting with a standardised common base.

As research objects in this study Swedish companies operating in industries with a high environmental impact is chosen. The reason is that companies operating within these types of industries have a tendency to engage to a higher degree in sustainability reporting in order to respond to sector-specific stakeholder pressure (Hahn & Künen 2013). The chosen industries are the forest-, paper-, industry-, mining-, and steel industry. All the selected industries have a high environmental impact. The forest and paper industry is considered to be a major consumer of natural resources when producing pulp and paper (European IPPC Bureau). The steel industry is the largest producer of GHG emissions in the industry sector in Sweden (Naturvårdsverket 2019) and the mining industry is classified as an environmentally hazardous industry in Sweden (SGU 2018)

1.5 Aim

In order for stakeholders to assess companies' actual environmental achievement there is a need for companies to provide enough information in their sustainability reports. Previous research has shown there is a need for companies to link external reporting and the internal management and control systems in order to be transparent in their reporting. It is therefore of interest to study how sustainability reports communicate about the implementation of environment strategies in the organisation.

The aim of this study is to investigate and explain the implementation of environmental strategies in the company's management control system in the forest-, paper-, mining-, and steel industry in Sweden.

Following research questions is asked in order to fulfil the aim of the study:

1. How are performance measurements provided in sustainability reports in order to inform stakeholders about the company's environmental strategy achievements?
2. How are accounting postulates used as a base for sustainability reporting?

3. What are the differences and similarities between the industries in providing performance measurements in relation to environmental strategies and accounting postulates?

Limitation of the aim and research questions is presented in the next section.

1.6 Delimitations

The studied documents are limited to published sustainability reports for 2019. The study is limited to environmental sustainability and excludes social and economic sustainability. Due to the outbreak of Covid-19 no interviews with representatives from the selected companies could not be performed.

1.7 Structure of the report

The first chapter (1) provides a background to the area of study, the aim, research questions and limitations. The second chapter (2) contains the theoretical framework of the study. Chapter three (3) describes the method used regarding research strategy and design, sample selection, collection of data, data analysis and quality. Chapter four (4) describes the empirical findings and analyses. Chapter five (5) contains a concluding discussion in relation to the aim and research questions. The end of the chapter discusses the limitations and suggestions for future studies.

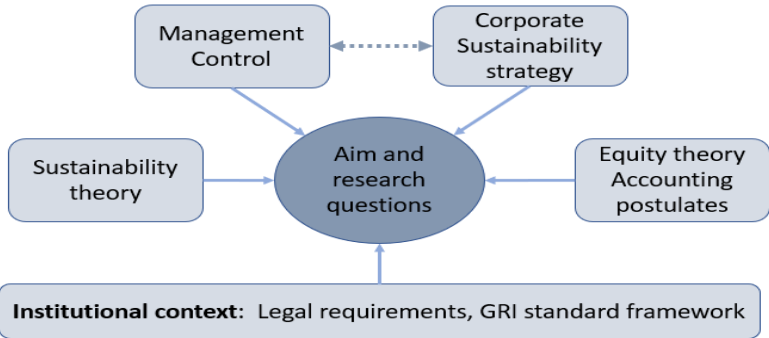
2 Theory

The first part of this chapter discusses the theoretical framework used in this study. The next sections present the used theories in detail. First, sustainability and how the development of different target groups for traditional financial statements has evolved is presented. This is followed by a presentation of the institutional context, including legal requirements and the GRI framework, the concept of corporate sustainability strategy, and management control. Finally, sustainability accounting postulates adjusted for sustainability is presented.

2.1 Theoretical framework

To investigate and explain how environmental strategies are implemented in the company management control system a theoretical framework, á priori model, is created (figure 2). The framework is used to analyse the empirical collected data from the sustainability reports.

Figure 2. Theoretical framework, á priori model



In order to understand whether companies are sustainable there is a need to define the concept of sustainability, which is done in section 2.2.1. The target groups for traditional financial statements have developed from a narrow owner perspective to a broader perspective, including the company’s social and environmental responsibilities. It is important to understand the development of a company’s responsibility in relation to how companies define their target groups. The development of the equity theory is explained in section 2.2.2.

The institutional context contains the legal requirements on companies and standards in the sustainability reporting area. Section 2.3 explains the EU directive for Non-financial reporting (2014/95/EU), the introduction into Swedish legislation and challenges with sustainability reporting. The selected industries in this study are also required to comply with regulations of industry emissions and qualify for permits to operate, which is presented in section 2.3.4. The most common standard framework for sustainability reporting is GRI. For companies that choose to report according to GRI they must commit to applying the requirements of the framework when creating their sustainability report. The GRI framework and its challenges is described in section 2.4.

In order to investigate and explain environmental strategies the concept of sustainability strategy is discussed in section 2.5. As stated in section 1.2 in order for environmental strategies to be implemented and evaluated a company needs to have a control system in place. The definition of management control systems is explained in section 2.6. Management control systems (MSCs) is considered to play an important role in supporting the implementation of

sustainability strategies in an organisation. Simons Levers of Control system (1995) is used in this study as a framework to build the relationship between corporate sustainability strategy and MSCs and is explained in section 2.6.1.

To analyse how the report has been built up and what the bases is for the reported data traditional accounting postulates adjusted for sustainability criteria's is used. The accounting postulates are used to identify how the companies define their area of boundaries in space and time. The difference between sustainability reporting and sustainability accounting and the adjusted sustainability accounting postulates is explained in section 2.7.

2.2 General theoretical background

In order to put the development of sustainability reporting into a context, the concept of sustainability and the development of selecting target groups for companies' financial statements is discussed.

2.2.1 The meaning of sustainability

Even if sustainability is not a new concept there is not a clear common understood definition what the term means (Hertzig & Schaltegger 2006). As a policy concept sustainability has its origin in the Brundtland report of 1987, which defines sustainability as "*development that meets the needs for the present without compromising the ability of future generations to meet their needs.*" (United Nations World Commission on Environment and Development 1987, p. 1).

In order to operationalize the sustainability perspective, the Triple Bottom Line (TBL) concept was introduced by John Elkington in 1997 (Hódi Hernádi 2012). The TBL broadened the traditional economic measures of profits, return on investment, and shareholder value and added the environmental and social dimensions. The TBL dimensions are also called the three Ps, people, planet and profits, and is the most used framework for sustainable development (Slaper & Hall 2011). TBL is used as the basic concept for sustainability management accounting tools and in sustainability reporting frameworks, one example is the Global Reporting Initiative (GRI) (Hartmann 2018). Dyllick and Hockert (2002) broadened the TBL frame when including the stakeholder perspective to the TBL concept. They defined corporate sustainability as the need to meet the needs of current stakeholder in order to be able to meet the needs of future stakeholders (Engert, Baumgartner & 2016). From this perspective a company is considered *economical sustainable* if it fulfils the principle of continuity, the owners profit expectation and maintains its own and its shareholders value (Hódi Hernádi 2012). A *social sustainable company* is one that contributes to the creation of social value when they increase both the individual human capital as well as supporting social goals in the community (Dyllick & Hockerts 2002). Companies can be identified as *environmentally sustainable* when they take into consideration their environmental impact in absolute terms. It is not enough to carry out activities in an environmentally sustainable way. The product or service produced should be sustainable as well (Hódi Hernádi 2012).

2.2.2 The development of Equity theories

The target groups for financial statements has developed from a narrow perspective, focusing on owners or investors, to a broader perspective, including the company's social responsibilities (Fagerström, Hartwig & Cunningham 2019). The target group is of importance since it determines the answer to the questions whose point of view should be taken into account when preparing the accounts and from which perspective the accounting transactions are analysed. Different targets group leads to different highlights in disclosing the interests of stakeholders (Van Mourik 2010).

The two main dominant perspectives in the group of equity theories are the proprietary and the entity theory (Schmidt 2018). The centre of interest in the proprietary theory is the owners. The main function of the financial accounting is to determine the increase of shareholders wealth and therefore priority is given to the need of the owners when providing information (Hendriksen & Van Breda 1992). In contrast to the proprietary theory the entity theory views the entity as having a separate existence from its owners and other interests are recognised. The responsibility of the management is primarily to the entity and the equity holders, including owners and creditors (Paton 1922).¹

Another perspective in the group of equity theories, the enterprise theory, takes a broader perspective and view large listed companies as a social institution operating for the benefit of many stakeholder groups. Management is responsibly to all the stakeholders including the shareholders, the employees, the creditors, the customers, the government and the general public (Suojanen 1954). This broad perspective can be defined as a social theory of accounting. The enterprise theory is most applicable to large corporations that has to take into account the impact of its actions on the society as a whole (Hendriksen & Van Breda 1992)

The sustainable enterprise theory (SET) is based on the enterprise theory. Fagerström, Hartwig and Cunningham (2019) developed the model by including the sustainability perspective to the social consideration described in the enterprise theory. In this model consideration is taken to the use of resources from a sustainable entity perspective, meaning social, environmental, technological and financial resources. Technological and financial resources are used to develop social and environmental sustainability in the entity. The SET model points out that some of the value generated during the production stays in the company; the social, environmental, technological and financial capital. In the long run these values have an impact on the monetary flows of the company and their stakeholders. A conclusion is that sustainability is built in the organisation and therefore the enterprise is required to take responsibility for sustainability over the full life cycle of the products.

2.3 Sustainability reporting and regulations

In the 1990s large companies started to report, on a voluntarily bases, separate sustainability reports. Initially, the reports focused on environmental issues and it was not until mid-1990th that issues regarding social, health and safety were included. It was rare that the terms ‘sustainability’ and ‘sustainable development’ were mentioned in these reports (Milne & Gray, 2013).

Reporting is still to a large extent voluntarily in many countries, even if there is a trend across countries that voluntary guidelines transition to mandatory reporting requirements (KPMG 2017). There is no common framework for reporting. A reporting entity can choice which framework to use. There are a number of reporting institutions: CDSB (Climate Disclosure Standard Boards), GRI (Global Reporting Initiative), (IIRC (Integrated Reporting Council), SASB (The Sustainability Accounting Standard Boards) and TCDF (Task Force on Climate-related Financial Disclosure). The many frameworks have led to question marks on what grounds an organisation chooses its data. Different frameworks also complicate the comparison between companies in the same industry and between years. The lack of a common framework also provides a high degree of flexibility in the reporting. This can lead to a risk for cherry-picking, which both misleads stakeholders and undermines the trust in the reporting (Fredriksson & Renström, 2016; Nyilasy, Gangadharbatla & Paladino 2014).

¹ The theory is further developed by Moonitz, M. (1951)

When comparing sustainability reporting to the development of financial reporting one can see that accounting regulations for financial reporting did almost not exist 90 years ago. Up until the stock-market crash in US in 1929 companies could choose between a wide variety of accounting principles. The Stock Market crash in the US and the bankruptcy in 1932 of the company Kreuger & Tolls raised demands on public accounting regulations by the market. Since then the creation of rules to form generally accepted accounting principles has been develop and implemented in countries legislations (Flesher & Flesher 1986).

The EU (European Union) moved away from voluntarily reporting and regulated the Non-Financial reporting when the European Commission (EC) adopted the Directive 2014/95/EU (Non-Financial Reporting Directive) for large public interest companies with over 500 employees. As from 2017 and onwards companies are required to include non-financial statements in their annual reports. The directive requires companies to publish reports regarding implemented policies related to environmental protection, social responsibility, treatment of employees, respect for human rights, anti- corruption bribery and diversity on company boards. Including in the disclosure should be information about the business model, policies in relation to the reported areas, the outcome of the policies, principal risks related to those matters linked to the undertaking's operation and non-financial key performance indicators relevant to the particular business (European Commission 2014).

The Directive 2014/95//EU however provides a high degree of flexibility to companies regarding what information is relevant to disclose. As a guide to what to include in the reporting the EC refers to widely accepted reporting standards and frameworks, like for example the GRI, SASB and IIRC (European Commission, 2014). In 2017 and 2018 the European Commission issued new guidelines and again they pointed out that companies can chose which guidelines to use in order to be in line with their business environment (European Commission, 2019). So, the directive regulates which areas companies need to cover in their sustainability reporting but not what information that needs to be provided. Even if reporting is mandatory it still leaves room for interpretations and what gets reported depends on which framework the company choose to use (D'Aquila 2018).).

In Sweden the EU Directive 2014/95//EU was introduced in December 2016 by changing the Swedish Annual Accounting Legislation (AAC) (1995:1554). AAC chapter 6, 10 §- 14 § was introduced. The law applies to companies which during the last two years had at least 250 employees, assets of more than 175 million SEK and a turnover of morn 350 million SEK (SFS 1995:1554).

According to AAC chapter 6, 12 § the Sustainability report should include information that is needed for understanding the development of the company and the impact of the company's activities including environment, social responsibility, treatment of employees, respect for human rights and anti- corruption. The report should include the business model, applied policies, result of the policies, identified risks, risk management and key performance indicators (SFS 1995:1554). According to the law the role of the auditor is to issue a limited assurance statement, meaning a statement where the auditor concludes whether or not a sustainability reports has been disclosed in accordance with the legal requirements stated in AAC chapter 6, 12 §. In line with the Directive 2014/95//EU the Swedish regulation covers the areas required for reporting but not what information that need to be provided (FAR, 2018).

The EU Directive 2014/95//EU is currently under review. As a part of the Communication on the European Green Deal in December 2019 the EC committed to review the directive. The aim is to ensure that investors and the civil society have access to relevant non-financial information

to be able to assess companies' impact on society and the environment. The identified policy options currently under review are to continue the non-binding guidelines, endorsement of a voluntarily standard of non-financial reporting or strengthening of the existing model by specification what the report should include and strengthening of the provisions regarding the assurance of the provided information. The deadline for the review is set to Q4 2020 (European Commission 2020).

2.3.1 Enforcement

The adopted EU directive for Non-Financial Reporting Directive (EU Directive 2014/95/EU) can be said to have taken a third way approach of regulation between voluntarism and hard regulation. The directive only regulates what areas needs to be covered in the report and not what needs to be reported. It is from this aspect a reflexive law which encourage the companies to be proactive in shaping their behavior. The reasoning is that the companies must be given flexibility to develop an approach to sustainability that is appropriate for their circumstances (Ahern 2016).

The problem is that even if non-financial reporting has existed for many years there is still no commons accepted standard. The impact of the Non-Financial Reporting Directive is highly dependent on the way each company choose to engage with the different reporting areas in the required disclosures (Ahern 2016).

Regulations is however not the same as enforcement of the implementation of the rules. Research in the area of financial accounting have identified key institutional factor that has an impact on financial reporting, namely corporate governance, statutory audit, institutional oversight system, courts and public and press sanctions. It has been shown that better auditing and accounting enforcement have a positive impact on financial information which thereby is influencing market development and financial reporting (Brown, Preiato & Tarca 2014).

Mandatory sustainability reporting is questioned because it lacks enforcement mechanisms and the fact that there is a need for credible report assurance practices and standards. In addition, it is seen as a potential risk that regulations may lead to a loss of the sense of ownership by the reporting companies (Brown, de Jong & Levy 2008). Research has however pointed out the risk that regulation without enforcement mechanisms will generate a behavior where companies say they comply with the regulations but fail to apply them (King & Lenox 2000).

2.3.3 Greenwashing

With the increased demand on companies to be transparent with their sustainability activities there is an increase of the phenomena called greenwashing. Greenwashing is defined in several ways but a common usage is that it includes "... communications that mislead people into adopting overly positive beliefs about an organization's environmental performance, practices, or products. "(Lyon & Montgomery 2015, p. 225). Greenwashing has a negative impact both on consumers and companies. Consumers are misled about the corporate image and the consequences can be that it impacts consumers' opinion about corporate environmental sustainability and the so-called consumer green trust. In the end it affects the consumers' willingness to purchase the company's products which will then affect the company's financial performance (Gatti, Seele & Rademacher 2019)

Research has showed that some companies may reports less about their sustainability work because of fear of being accused of greenwashing (Gatti, Seele & Rademacher 2019). On the other hand, if companies do not report on negative outcomes their reliability is at risk and disclosing a negative aspect can in fact be seen as a positive signal of actively managing risks

(Rüdiger & Lülfs 2014). Greenwashing researchers argue that a reduction of greenwashing activities requires at least industry-wide codes of practices and, at best, regulation. Arguments has however been raised against this approach claiming that an exclusive mandatory approach may favor the establishment of grey zones where companies look for ways around the rules (Gatti, Seele & Rademacher 2019).

2.3.4 Regulations of industry emissions and permits to operate

The Industrial Emissions Directive (IED, 2010/75/EU), adopted in 2010, is the main instrument within EU to regulate pollutant emissions from industries. Each Member States is obliged to comply with the directive and integrate the requirement into the country's own regulations. The industries included in the directive are required to operate in accordance with a permit (granted by the authorities in the Member States). The permit conditions, including emission limits, must be based on the Best Available Techniques (BAT). In order to define BAT and the BAT-associated environmental performance at EU level there is a joint work performed by the EC, the Member States and environmental organisations. The work results in a technical document called the European Best available Technique (BAT) Reference (BREF) documents and describe the best available techniques and environmental performance for different sectors of the industries (European IPPC Bureau). The Industrial Emissions Directive IED, 2010/75/EU), was adopted in Swedish legislation in 2013 (Naturvårdsverket 2019).

Not all industries are part of the directive. For example, BREF documents are issued for the Forest and paper and steel industry but not for mining. To make an environmental assessment to approve a licence to operate for mining The Geological Survey of Sweden (SGU) provides a guidance regarding which environmental requirements need to be taken into consideration (SGU 2016).

2.4 Global Reporting Initiative (GRI)

The framework provided by GRI is one of the most widely used frameworks for sustainability reporting. 75% of the largest companies in the world reporting on sustainability use GRI (Global reporting, 2020). In Sweden almost 50% of the listed companies use GRI as framework (Stiernstedt 2018).

The GRI was established in 1997 as a joint project by the US Coalition for Environmentally Responsible Economies and the UN Environment Programme. Its goal is to promote transparency and dialogue between companies and stakeholders through companies' sustainability reporting on a set of standards covering governance (GRI 100), economic (GRI 200), environmental (GRI 300) and social (GRI 400) performance. GRI is a voluntarily standard and is providing a norm on what to report and how to report. For an overview of the environmental GRI indicators see Appendix 3. According to the framework companies needs to report on first, their profile (context information on profile, strategy and governance), second, their management approach (how they address relevant topics) and third performance indicators (social, environmental and economic performance) (Laurence, Humphreys & Moon, 2015).

There are two options for preparing a sustainability report in accordance with the GRI standards; core and comprehensive. The core option demands that a report contains the minimum information needed to understand the nature of the organisation, its material topics and related impacts, and how these are managed. The requirement is to comply with all reporting requirements for at least one topic-specific disclosure covering the economic, environment and social standards. The comprehensive option on the other hand is requiring additional disclosures on the organisation's strategy, ethics and integrity, and governance. In

addition, the organisation is required to report more extensively on its impacts by reporting all the topic-specific disclosures for each material topic covered by the GRI Standards. The reports need to comply with all reporting requirements for all topic-specific disclosures (GRI, 2020, GRI standards 101- foundation). The reporting principles, as defined in GRI 101 foundation, are stakeholder's inclusiveness, sustainability context, materiality and completeness.

Information on performance is expected to be put in a context regarding how an organisation contributes at the local, regional or global level, depending on where the organisation operates. The criteria for materiality encompass two dimensions; relevant topics sufficiently important to report and stakeholders. When assessing the level of materiality, it includes the organisation's overall mission and competitive strategy and concerns expressed directly by stakeholders. Materiality can also be determined by a broader expectation from the society and the environment. Completeness means that the report covers the material topics to reflect the impact of the organisation, a description of where the impacts occur for a material topic and report it in the disclosed report (GRI standards 101- foundation).

GRI standards have not yet developed sector specific standards, but it is currently ongoing. However, the previous GRI standards, G4, developed disclosures for some sectors that is still required to use. The sectors included are Airport Operators, Construction and Real Estate, Electric Utilities, Event Organizers, Financial Services, Food Processing, Media, Mining and Metal, NGO and Oil and Gas (GRI Sector program, 2019).

There are both positive and negative aspects using GRI as reporting framework. On the positive side is the growing usage of the framework. This increase the possibility for comparing and benchmarking between companies and industries. The tool can also be used both for internal and external reporting and, in that way, support companies in their sustainability work (Rimmel & Sabelfeld 2018). A more negative aspect is that the framework to a large extent has an internal focus on sustainability. It is therefore a risk that the reporting promotes information that lack data regarding the company's external impacts, which can mislead the reader regarding the sustainable development of the company (Rimmel & Sabelfeld 2018). Another negative aspect is that the standards gives a lot of flexibility for own interpretations and adjustments. GRI is only acting as a guide providing recommendations. This complicates the comparability between companies and industries. There is neither requirements that states that all information needs to be included in a standard GRI reporting. And in addition, there are no requirements for motivating why some information is included and some is not (Rimmel & Sabelfeld 2018).

2.5 Corporate sustainability strategy

If companies aim to make improvements in their social and environmental performance in the long term, beyond sustainability reporting, there is a need to ensure a link between strategic processes and relevant activities (Arjaliès & Mundy. 2013). The integration of sustainability in corporate strategy would be the starting point since the development and implementation of strategies can assist in driving operational sustainability performance (Epstein & Roy 2001; Bennett & James 1998).

Before discussing corporate sustainability strategy, the concept of strategy needs to be clarified. According to Mintzberg strategies explains the meaning and vision of a company to both internal and external stakeholders and at the same time it defines the boundaries for corporate policies. In this meaning strategy contributes to a better understanding of corporate identity and culture (Engert, Rauter & Baumgartner 2016). When formulation strategies the questions which needs to be answered is where are we now and where do we want to be (Mintzberg & Waters

1985). Mintzberg (1987) identifies at least four ways the term strategy can be used; as a plan, a pattern of actions, a competitive position and as overall perspective of the world. The most common understanding of the concept strategy is as a plan, meaning a consciously intended course of action in order to deal with a situation. The plan is made in advance of the actions to be taken and they are developed with a purpose of what they want to achieve. (Mintzberg, 1987; Simons 1995). This study will use the term corporate strategy as defined plan which defines the actions the company wants to take in order to achieve its goals.

To integrate sustainability into corporate strategic management the aim needs to be to balance the environmental, social and economic needs for both the company and the society. As a first step to implement sustainability companies need to formulate and revise their strategies to include the sustainability dimensions. (Epstein & Roy 2001). In line with TBL an *economic sustainable strategy* includes financial performance, long-term competitiveness and creation of value, *environmental strategy* includes the goal to reduce the size of the companies ecological footprint, by integrating environmental considerations into operations, and *social strategy* incorporates both equality, within and outside the corporation, and internal and external social improvements (Wijethilake 2017).

2.6 Management Control Systems

Traditionally, the basic purpose with management control systems (MSCs) has been to support management to reach the objectives of the organisations by providing a formalised framework which identify relevant control variables, develop plans, follow up performance and explain differences (Simons, 1995).

There are however different ideas what management control includes and there is not one common definition (Crutzen, Zvezdov & Schaltegg 2017). One distinction made to define management control is between systems for decision-making and MSCs. Accounting systems, which sole purpose is to support decision-making and is not used for guiding employees' behaviour, is classified, according to this view, as management accounting systems. Systems that on the other hand is designed with a purpose to guide and direct employees are management control systems, MCS (Malmi & Brown 2008). MCS can thus, from this viewpoint, be explained to include all systems that managers implement and use in order to formally and informally ensure that the behaviour and decisions of their employees are consistent with the organisation's objectives and strategies (Malmi & Brown 2008; Simons 1995). Management control systems (MSCs) is considered to be able play an important role in supporting the implementation of sustainability strategy in an organisation Recent research has stated that financial and nonfinancial information can be considered equally important in MSC for both strategy implementation and development (Crutzen & Herzig 2013).

2.6.1 Levers of control and sustainability

To develop a Sustainable Management Control Systems (SMCSs) there is a need to understand what is required to link sustainability strategy and corporate sustainability performance but also how to build the relationship. The levers of control framework (LOC) developed by Simons (1995) is used in this study to understand the level of integration of environmental strategy in the selected companies. The LOC provides in this study a framework for the relationship between corporate sustainability strategy and MSCs.

The integration of sustainability into all levels of an organisation, all essential activities and controls, is today regarded as one of the most important pieces in order to move towards a more sustainable society. Despite that an increasing number of companies formulate sustainability strategies and disclose external reports sustainability is not always integrated into the

organisation. In addition, the control systems and evaluation of sustainability activities are made outside the traditional MCS (Busch 2018). If SMCSs are used as separate tools and do not inform a company's conventional MCSs they fail to influence the strategy as they are disassociated from the core business activities (Gond. et. al.2012).

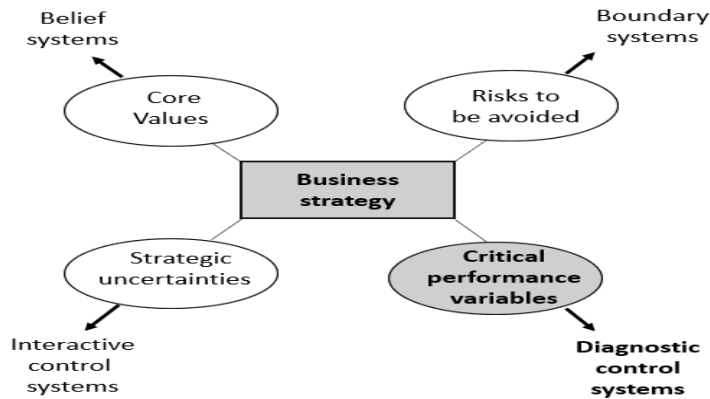
Simons (1995, p 5.) defines MSC as “*the formal, information-based routines and procedures managers use to maintain or alter patterns in organizational activities*”. Simons argues that the information-based systems become control systems when they are used to maintain or change the behaviour in organisational activities. If not used for this purpose they are not control systems but information systems only used for decision-making.

In order to build a relationship between corporate strategy and MSC Simons developed, in 1995, the Levers of Control (LOC) framework. It has been widely used in academic research as a conceptual framework to study the integration of strategies in organisations (Martyn, Sweeney & Curtis 2016). The created LOC framework can be used to analyse how organisations leverage their MCS in order to implement business strategies. Simons identifies four levers of control. Of the four levers, two are defined as positive (belief systems and interactive control systems) and two are defined as negative (boundary systems and diagnostic control systems (Tessier & Otley 2012).

At the centre of Simons framework is the role of business strategy. Simons (1995) point out that in order to implement strategy successfully there is a need for top management to understand each of the four key strategic variables: core values, strategic uncertainties, risks to be avoided and critical performance variables. Simons LOC framework is illustrated in Figure 3. and shows the four levers of control and its underlying strategic variables.

The Belief systems communicate organisations values, purposes, and future directions. They are communicated as mission and visions statements and the primary purpose is to inspire and guide the organisation (Simons 1995). *The Boundary systems* are used to define and establish limits and rules which needs to be followed in the organisation. These limitations support managers in their work to identify risks (Albertini 2019). *The Interactive systems* are formal information systems managers use to involve themselves regularly and personally in the decision activities of subordinates.” (Simons, R. 1995, p.95). The intention of interactive controls is to improve the dialogue and learning between managers and employees across the organisation (Simons, R. 1995). *Diagnostic systems* are formal information systems which are designed to provide feedback for evaluation and monitoring of performance (Wijethilak 2017). Simon (1995, p. 59) defines diagnostic systems as “*the formal information systems that managers use to monitor organizational outcomes and correct deviations from pre-set standards of performance.*” Feedback systems are considered to be the backbone of traditional management control (Simons 1995).

Figure 3. Simons, Rs Levers of Control

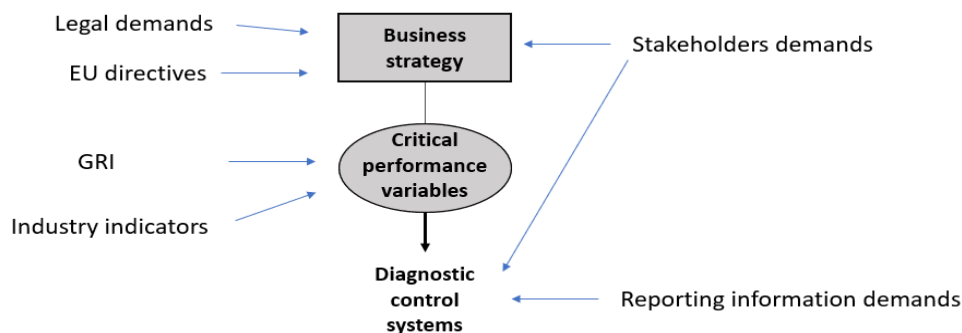


Source Simon, R. (1995).

This study focuses on performance indicators and thereby the diagnostic control systems. Both the belief systems and the interactive control systems can only be reviewed when having access to internal information in the organisation, which is not in scope for this study. The boundary systems define limits, based on risk assessment, for seeking new business opportunities. The boundaries, in the form of code of conduct and policies, is also not in scope since it would also require an access to internal information to understand the perceived risks.

According to Simons (1995) a strategy is a defined plan, which incorporates defined targets. These targets are used to control the implementation of the strategy in the organization. The role of diagnostic control systems is to monitor the performance against these targets. A variable for each strategy needs to be created and measured. These variables are called *critical performance variables* (Simons 1995) They can also be defined as key success factors. The critical performance variables, according to Simons (1995), are those variables that needs to be achieved in order to manage the implementation of the defined strategies. For each variable a performance measurement indicator is created to monitor the activities in the organisation (Simons 1995). The diagnostic control system has several dependencies from a sustainability perspective, which is illustrated in figure 4.

Figure 4. The diagnostic control system and its dependencies



Source: Developed and adopted from Simons (1995)

The increased stakeholder pressure (chapter 1), including the society and the environment, influences the company. There is also an increased legal demand in terms of mandatory sustainability reporting (section 2.3). Both these aspects influence the business strategy. To determine the critical performance variables and the performance indicators the GRI (chapter 2.5) is used by many companies as a standard frame for reporting. The GRI framework provides a number of categories to report and related indicators. The reported performance indicators can be used as a tool for both monitoring compliance with external regulations and standards and to provide information on social and environmental activities and performance to internal and external stakeholders (Battaglia, Pasetti, Bianchi. & Frey, 2016),

2.7 Sustainability accounting

Traditional accounting regards the economic organisation as a closed system, existing independently of its social and natural environment. In contrast, corporate sustainability claims that a company can only have a long-term profitability if it does not ignore its effects on society and the environment and therefore there is a need for a change of the accounting system in favour of sustainability (Hódi Hernádi, B. 2012). This section introduces adjusted sustainability accounting postulates as a method to introduce sustainability into traditional accounting.

2.7.1 Adjusted sustainability accounting postulates

Traditional accounting is based on systematic ordered accounting, using generally accepted accounting principles, regulations and good accounting practice, which can be verified through good auditing practice (Fagerström, Hartwig & Lindberg 2016). This is in contrast to sustainability reporting that is less structured and where rules and customs are under development. Sustainability reporting can be done without any underlying accounting systems and therefore only a lighter form of audit can take place, a so-called attestation. (Fagerström & Hartwig 2016).

Financial reporting is based on standards postulates, i.e., basic accounting assumptions. Postulates are used to meet the objectives of financial reporting, which is to providing useful financial information to stakeholders and work as a base for economic decision making (Fagerström Hartwig & Cunningham 2017). The four postulates, used in IFRS, US GAAP and similar concepts of accounting principles in many countries, are the following (Cunningham, Fagerström & Hassel 2011):

- Going concern
- Reporting entity
- Monetary unit
- Time period

Since the accounting postulates are the basic assumptions that form the foundation of accounting and reporting they could, according to Fagerström Hartwig and Cunningham (2017), act as a base also for sustainability accounting if they are modified to be applicable to the area of sustainability. Since the sustainability adjustments for the postulates are considered to be based on universal assumptions regarding sustainability it is expected to be found in all sustainability reports, independent of company or industry. Table. 1. below shows a summary of the traditional accounting postulates compared with the modified sustainability postulates.

Table 1 Accounting postulates compared to modified sustainability postulates

Postulate	Traditional	Modified for sustainability
Going Concern	Unlimited time, in order for the entity to complete its obligations	Unlimited time, in order for the entity to complete its obligations towards achieve sustainability related goals
Accounting unit	Accounting unit based on ownership and control	The sustainable area of responsibility, where company has direct and indirect control
Accounting period	Specific time, normally one year	The entire life cycle of the production
Monetary unit	Monetary unit	Unit of measurement for each sustainability indicator, including risks and opportunity factor

The accounting concept of *going concern* assumes that an entity will be in business for an unlimited time in order for the entity to complete all its obligations. The concept affects the valuation of assets and liabilities on financial reports and it is the base for an auditor's report of the financial statement (Cunningham, Fagerström & Hassel 2011). Sustainability can be seen as the same concept as the going concern since lack of sustainability means lack of going concern (Cunningham, Fagerström & Hassel 2011). From a sustainability perspective there is however a need to broaden the definition of time. The time from a sustainability perspective is the time it takes for a company to achieve sustainability related goals, for example environmental clean-up and recycling, in order to meet its financial and sustainability obligations (Fagerström, Hartwig & Lindberg 2016). From a sustainability view there are several dimensions to include in the going concern concept as part from the financial dimension (Fagerström, Hartwig & Lindberg 2016). These can be compared with the definition of sustainability in section 2.2.1 and in the SET theory, section 2.2.2

- *Financial dimension*

A company has to generate a profit and a return on investments for its owners, lenders and investors to survive in the long run.

- *Social Sustainability*

In order for a company to survive in the long run employees and the public sector should receive a share of the company's value. Employees should receive sustainable wages and governments should be able to collect taxes at a sustainable level.

- *Environmental Sustainability*

A company needs to some extent make investments in the environment in order to survive, which generates cost and depreciation of the investments.

- *Technological*

For a company to be competitive in the market it is important to make investments in new technology, like investments in R&D for development of new products and processes.

If a company would face issues to meet its obligations towards the sustainability dimensions, described above, the business cannot continue in an unlimited future. The going concerns postulate also has an impact on capital since the company needs to have enough capital to both cover financial and sustainability risks (Fagerström Hartwig & Cunningham 2017). In this study only the environmental aspect of the going concern concept is taken into account.

Financial accounting defines *the accounting unit* based on who owns and controls the unit. It defines what transaction, obligations and contracts that needs to be included in the accounting (Fredriksson & Renström,2016). In financial reporting an economic entity is defined in legal terms, is well regulated, and is the base for accounting. In sustainability reporting the concept

of unit needs to be broadened and include a broader stakeholder environment due to the nature of sustainability (Cunningham, Fagerström & Hassel 2011). Sustainability accounting includes all sustainability aspects for the produced product. Therefore, according to Fagerström and Hartwig, (2016, p. 15), sustainability accounting needs to include the entire life cycle of the product, which is called “the sustainable area of responsibility.”. The boundary for the unit “...includes all activities where the company has some sort of control over the business. Control of sustainability aspects can be exercised directly through responsibility for the companies or the Group’s own operations and indirectly through the company’s responsibility to choose suppliers that meet the company’s requirements for sustainability. Furthermore, the indirect control means that the company is responsible for the products the company sold over the useful life of the products, including recycling. “. Indirect control means that the company have a possibility to influence its stakeholders, including all aspects of use of raw materials and decent working conditions at the supplier side to influencing customer to increase recycling of the product (Fagerström and Hartwig 2016)

In a sustainability reporting context, it becomes important to identify what units is included and what is excluded in the report so it is clear for the reader what the company regards as its boundaries of responsibility. This is important in order for the reader to understand the report from the specific company but also to be able to compare companies. There can be different units for different companies, some might include all group companies and first level suppliers. Others might see the entire value chain as their scope of responsibility.

Traditional accounting is based on a specific time period, normally a year. The reason is that stakeholders need a limited time in order to evaluate the profit and financial position to be able to make useful economic decisions (Fredriksson & Renström 2016). The *accounting period* from a sustainability perspective differs from the traditional accounting period since many of the issues relates to long term consequences for the environment. The sustainability accounting can therefore not measure result and positions from a specific time period. The entire life cycle of a production needs to be included in the assessment of risks and opportunities. During a calendar year the outcome can include production during the period. For the part of the product that not has been used during the period forecasted calculations can be reported regarding the products sustainability. It is as well important that sustainability reporting points out what is a documented outcome and what is forecasted or calculated (Fagerström & Hartwig 2016).

Traditional financial reporting is based on *monetary units*. Also, non-monetary items are reported and translated into monetary amounts. This facilitates comparison over time and between companies. In sustainability accounting however almost all information regarding environmental and social are reported in narrative non-monetary terms. There is today no common method to incorporate “free” environmental resources, for example emissions of greenhouse gases. Carbon emission trading has for example so far not been incorporated into products (Cunningham, Fagerström & Hassel 2011). Due to the difficulties in converting all sustainability indicators to money Fagerström & Hartwig (2016) propose that there should be recommended unit of measurement for each sustainability indicator. In order to evaluate risks and opportunities they propose to include a risk and an opportunity factor when reporting indicators.

3 Methodology

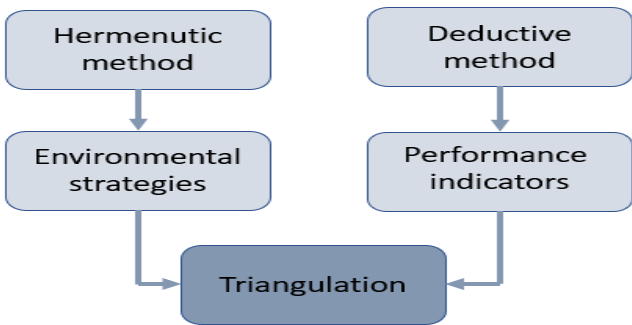
This chapter outlines the general structure, the strategy and the design of the method behind the study. It explains how data has been collected and any impacts it might have on the study. It also discusses quality criteria of the chosen method.

3.1 Research strategy

The aim of the study is to build an understanding of how environmental strategies are implemented in company’s management and control system based on what the companies communicate in their sustainability reports. The empirical data collection is based on information provided in sustainability reports. A deductive approach is applied to test the theoretical framework, described in section 2.1 (figure 2), on the empirical collected data (Bryman & Bell 2015, Saunders, Lewis & Thornhill 2012).

To answer the research questions how performance measurements are provided and how accounting postulates are used triangulation is used as research strategy, meaning that the study uses a combination of a qualitative and quantitative research strategy (Bryman & Bell 2015), which is illustrated in figure 5.

Figure 5. Method of triangulation



To interpret the text in the sustainability reports regarding the communicated environmental strategies a hermeneutic method is used. In order to understand what performance indicators are reported and how the indicators are reported in the sustainability reports a deductive approach was applied to measure the collected data. The findings are compared to each other in order to analyse how the reported environmental strategies are transformed into reported performance measurements.

3.2 Literature search

To build an understanding of the area of study a narrative literature review was performed. The purpose of the review was to gain knowledge about what is known about sustainability reporting, implementation of environmental strategies and to create a theoretical framework for the study. Compared to a systematic review, a narrative review uses a more open and less explicit approach when it comes to which criteria are excluded or included in the study. Since the aim of the literature review was to build an understanding of the area of study and create a theoretical framework a narrative approach was used. (Bryman & Bell 2015).

The main source of literature and articles in scientific journals is found through the databases Primo, Swedish University of Agricultural Sciences (SLU) library and Supersök, Gothenburg University Library. The main keywords used were accounting postulates, enforcement, corporate sustainability strategy, GRI, levers of control, sustainability reporting, sustainability accounting, management control systems, sustainability management control systems

3.3 Sample selection

The document study is based on published sustainability reports. The selection of companies in the study was done in two steps. Firstly, the selection of relevant industries was done and secondly the selection of companies.

The selection criterion for the industries were industries with a large negative impact on the environment. Companies operating within these types of industries have a tendency to engage to a higher degree in sustainability reporting in order to respond to sector-specific stakeholder pressure (Hahn & Künen 2013). The selected industries were the forest-, paper-, steel- and mining industry. The mining industry has been under pressure for many years due to its pollution of water, air and land (Ranängen & Lindman, 2017). 19% of Sweden’s Greenhouse Gas (GHG) emissions has its origin in the mining industry (Naturvårdsverket, 2019). The steel industry is the largest contributor of GHG emissions in Sweden (Naturvårdsverket 2019). The forest industry contributes in a positive way to the climate by binding CO2 in the forest. On the other hand, paper and pulp production is having a negative climate impact through extensive use of water, emissions to the air and production of waste (European IIPC Bureau 2019)

The selection of companies in each industry was based on five criteria: operating in the Swedish market, meeting the requirements to comply with AAC chapter 6, §12, Swedish ownership, listed company on the Swedish Nasdaq OMX large cap list and using GRI Core standards as reporting framework.

The reason for selecting only one market and for companies to be listed on the Swedish Nasdaq OMX large cap list was the assumption that similar market conditions and stakeholder influence leads to an increased comparability. Swedish ownership was chosen as a criterion since companies, according to AAC chapter 6 §12, can refer to a consolidated sustainability reporting issued by a foreign parent company and therefor does not need to disclose a separate Swedish detailed report (SFS1995:1554). One of the challenges with sustainability reporting is the existence of the many frameworks, which makes comparability between companies and industries difficult. The use of the same framework was therefore a necessary selection criterion in order to enable comparisons between the companies in the study. GRI was chosen as selection criteria since it is one of the most widely used frameworks for sustainability reporting in Sweden. Almost 50% of the listed companies use GRI as framework (Stiernstedt 2018). Table 1. below show the selected companies and the comparison of the companies in each industry related to turnover and number of employees.

Table 2. Selected companies

	Billerud Korsnäs	SCA	Holmen
Turnover FY19 (billion SEK)	24.4	19.6	16.9
Industry	Forest and Paper	Forest and Paper	Forest and Paper
Number of employees	4 500	4 253	2 915
Separate/ integrated sustainability report	Integrated	Integrated	Integrated

	LKAB	Boliden Mineral AB
Turnover FY19 (billions SEK)	31.3	7.0
Industry	Mining	Mining
Number of employees	4 300	3 442
Separate/ integrated sustainability report	Integrated	Integrated

	Sandvik AB	SSAB	Höganäs
Turnover FY19 (billions SEK)	103	76	10.3
Industry	Steel	Steel	Steel
Number of employees	40 235	14 500	2 500
Separate/ integrated sustainability report	Integrated	Integrated	Separate

Three companies from each of the Forest and Paper and the Steel industry were chosen in order to make a comparison within each industry. Two companies were selected from the Mining industry. Only two companies were selected in the mining industry since the majority of the mining companies in Sweden are not Swedish owned and the turnover in many of the Swedish owned companies is too low to qualify for mandatory sustainability reporting according to AAC chapter 6, §12. Since mining is an industry with a large negative environmental impact and is an important industry in Sweden it was still included in the study.

The companies in the Forest and Paper industry (Billerud Korsnäs, SCA, Holmen) were chosen based on the Swedish Nasdaq OMX Large cap list. The steel companies (Sandvik, SSAB) were chosen from the same base. To select the third company another approach was taken. The reason is that the majority of the steel companies operating in Sweden have a foreign owner and therefore do not publish a sustainability report in Sweden. The third steel company, Höganäs, was selected based on a list of Swedish steel companies published by Jernkontoret, which is the Swedish steel producers' association. Höganäs is owned by private investors and is not a listed company. The two companies in the mining industry (LKAB, Boliden) were chosen partly based on the Swedish Nasdaq OMX Large cap list (Boliden), partly based on a list of the biggest mining companies in Sweden produced by Largest companies (LKAB). LKAB is a governmental owned mining company, but due to that most of the large mining companies are not Swedish owned and LKAB is the largest mining company in Sweden it still qualified for the selection

3.4 Empirical collection of data

The documents used in the study were external published sustainability reports from 2019, which is the latest published year. Only one year was selected since the purpose of the study was not to show evolvement of sustainability reporting during a longer time period for the selected companies and the industries. Another reason is that the EU Directive 2014/95/EU became applicable in Sweden for the financial year starting in January 2017 (SFS 1995:1554). The first two years might include implementation problems. By selecting 2019 these potential disturbances of the result are avoided.

The Annual Accounts for all companies and the separate sustainability report for Höganäs were downloaded from the selected companies web pages. In addition, if the company had published a separate GRI index, these documents were also downloaded from the company's web pages.

Although the sustainability reports have been published as a separate section in the Annual Accounts the Financial published information were not included in the area of study.

3.5 Method for data analysis

To analyse the selected documents a quantitative and a qualitative content analyse was performed. A content analysis can be defined as “*a research technique for making replicable and valid inferences from texts (or other meaningful matter) to the contexts of their use.*” (Drisko & Maschi, p. 2. 2016). Content analyses can be quantitative or qualitative. The quantitative content research method is data coding of text data into explicit categories and then described using statistics (Hsieh & Shannon 2005). The quantitative analytical technique only or predominantly addresses the literal content of a text, the manifest. Counting the frequency of words or passages is used to determine the relative importance of a specific content (Drisko & Maschi 2016). The qualitative content analyses on the other hand is not focusing on the frequencies but on the qualities in the communicated message (Rosengren & Arvidson 1992) and does not use statistical analytical methods. The model allows exploring a complexity in the document that may not be possible in the quantitative approach.

In this study a qualitative content analyse was used when collecting information from the sustainability reports regarding the companies communicated environmental strategies. A quantitative approach was taken in order to measure what performance indicators were reported in the sustainability reports and how the indicators were reported.

3.6 Content and data analysis

To perform the content analyse two coding schedules were created. One was created to answer the first research question how performance measurements are provided in order to inform about the companies’ environmental strategic achievements and its environmental impact. The second coding schedule was created to answer the second research question how accounting postulates are used as a base for sustainability reporting.

The first step in creating coding scheme 1. was to identify the environmental strategies for each company. The strategies were partly found as part of the overall company strategy in the Annual Accounts and partly expressed in the sustainability chapter of the Annual Accounts. The concept of strategy is in this study defined as a defined plan which determines the actions the company wants to take in order to achieve its goals (chapter 2.5). A content analyse was performed to identify the environmental strategies in accordance with this definition. The identified environmental strategies were thereafter categorised to be line with the environmental categories in the GRI framework. The related performance indicators for each category was also identified. The details regarding the environmental GRI categories and indicators can be find on the GRI web page, www.globalreporting.org.

The second step taken was to create a baseline. As discussed in section 1.4, stakeholders influence companies’ environmental strategies and there is an expectation from stakeholders on companies to report their actual environmental impact and their actions in the relevant areas. The baseline is created based on a general identified environmental impact for each industry. The information regarded the environmental impact was collected from different data sources. For the Forest and Paper industry and the Steel industry the environmental impact for each of them was based on the BREF documents per sector (section 2.3.4). For the mining industry the guidelines for approving a licence to operate for mining issued by SGU (section 2.3.4) is used

as the base. After the information was collected the environmental impact for each industry was categorised according to the environmental categories in the GRI framework. These categories were expected to be found in the sustainability reports for each specific industry. Each GRI category provides a number of performance indicators. The baseline was defined to include all the GRI performance indicators for each category (www.globalreporting.org)

The GRI performance indicators can be defined as the content unit to be analysed in the sustainability reports. The content of the information provided for each GRI indicator was assessed based on points. Each indicator was given 1 point. The total identified indicators in the industry baseline became the max points the company could achieve. Each indicator identified for the company’s environmental strategy was also given 1 point. To investigate how performance indicators were actually provided points were allocated based on what information was reported for each indicator. The provided points ranged from 0, 0.5 to 1. In Table 3 the coding scheme and the definition for the assessment is explained. A comparison was then made between the achieved points from the actually reported performance indicators and the expected points coming from the environmental strategy and the max point coming from the industry specific baseline

Table 3. Coding scheme 1. Performance indicators

GRI indicators expected for the industry	Baseline	Expected reported GRI indicator - environmental strategy	Points	Not reported/ reported	Additional explanation
GRI indicator			0	Indicator not reported	Indicator is not reported at all in the GRI index or is reported in the index but not in the report
			0,5	Indicator partly reported	Indicator partly reported but not completely according to the GRI guidelines
			1	Indicator fully reported	Indicator is reported in a detaild way or completely according to the GRI guidelines

Despite the definition on how the points were allocated for each indicator there is a risk for subjectivity which lower the reliability of the analyses. In this case the word “partly” and the term “detailed way” in the Coding scheme 1. can leave room for a subjective interpretation. Reporting of performance indicators has been classified as “partly reported” when the company has reported half of the requirements in the GRI standards and in addition not in accordance with the standards. For example, the indicator “GRI 301-1- Materials used by weight or volume” requires that you report and make a split between non-renewable and renewable materials used. If the company has reported the total weight but has not made the split the indicator has been classified as partly reported. The indicators have been classified as “reported in a detailed way” when the company has provided enough information for the reader to understand the performance indicator even if not exactly in accordance with the GRI requirements. An example is that all the required information for an indicator has been provided separately in the report instead of in the same section.

The selected companies were analysed separately in accordance with coding scheme 1. In order to be able to compare between the industries an aggregated version was also created. The aggregated version was based on the industry baseline and an average of the received points for the industry. An aggregated version of the environmental strategies for the industry was also created. It was done by ranking the environmental strategies mentioned by each company based on how many of the companies in the industry had mentioned a specific strategy.

The second coding schedule was created to answer the second research question how accounting postulates are used as a base for sustainability reporting. The coding schedules was based on the definition of the adjusted sustainability accounting postulates (section 2.7). GRI

indicators from the environmental areas was identified for each postulate. The postulate “*Monetary unit*” represents the provided performance indicators, which is covered in coding scheme 1. For the other postulates, in opposite to coding scheme 1., the GRI indicators in coding scheme 2. were not analysed based on how the indicator had been reported but if the GRI indicator had been included or not. The reason is that the investigation of how the postulates are used is to build an understanding of what the company see as their area of responsibility, does the responsibility ends at the company level at the end of the fiscal year or does it include a life cycle perspective and an extended perspective on the reporting unit. It is not to understand how the performance indicator in itself was reported, which was the aim in coding scheme 1. Table 4. below shows the coding scheme for the postulates.

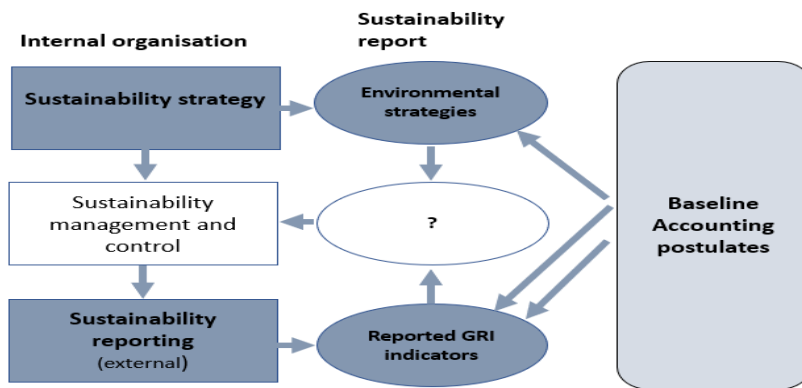
Table 4. Coding scheme 2. Sustainability accounting postulates

Postulate	Modified sustainability postulates	Area of study
Going Concern Environment	Unlimited time, in order for the entity to complete its obligations towards achieve sustainability related goals, Environment	Are environmental investments reported? If yes, are related costs and deprecation of the investment reported?
Accounting unit	The sustainable area of responsibility, where company has direct and indirect control	Are all group companies included in the sustainability report? GRI 308- 1. New suppliers that were screened using environmental criteria GRI 308-2. Negative environmental impacts in the supply chain and actions taken GRI 302-2. Reported Energy consumption outside of the organization GRI 305-2. Energy indirect (Scope 2) GHG emissions GRI 305-3. Energy indirect (Scope 3) GHG emissions
Accounting period	The entire life cycle of the production	Does the report mention to what extent the products are recycled? GRI 301-2. Recycled input materials used
Monetary unit	Unit of measurement for each sustainability indicator, including risks and opportunity factor	Number of included GRI indicators compared to expected reported indicators Are Risks and opportunities taken into account for each reported GRI indicator?

The *Going concern* aspect is limited to investments in environmental projects in this study. To study *the Accounting unit* in the sustainability report and the sustainable area of responsibility the first question relates to the direct control of the company and which units the companies include. The related GRI indicators cover how the company see the boundary for its indirect control. In order to study *the accounting period*, the GRI indicator 301-2- Recycled input material was identified. The period of time for sustainability is the entire life cycle of a product and the recycled material represent the end of cycle.

The empirical data is analysed based on these two coding schemes. An overview of the method for analysing of the empirical data is illustrated in figure 6.

Figure 6. Method for analysing the empirical data



The left side of the figure shows the sustainability work taken place inside the company. Sustainability strategies are created and are implemented and followed by control systems. The control systems are created to measure and evaluate the outcome. One control tool to use is the development of performance indicators (see figure 1. in section 1.2 where the internal sustainability process is explained). The middle part of the figure shows information available in sustainability reports. Both the environmental strategies and GRI performance indicators are reported in the external sustainability reporting. What is not reported is the management and control system, which therefore is marked with a question mark. The right hand of the figure shows the industry baseline and the accounting postulates. They are used to evaluate how the environmental strategies are implemented in the management and control system. The accounting postulates are used to analyse the boundaries of the sustainability reports. The created industry baseline is used firstly to evaluate what environmental areas are included in the strategy in relation to the industry baseline, to build an understanding to what extent the company takes into consideration its actual environmental impacts in its strategies. Secondly the industry baseline is used to evaluate to what extent the companies reports GRI indicators in relation to the baseline and the quality of the reported indicators. The empirical findings can provide insight to how the environmental strategies are implemented into the management and control system. Simons Rs framework LOC provides a tool to analyse how the reported strategies are transferred into measurable achievements. By comparing the empirical findings when analysing the result of the environmental strategies and the performance indicators the tool can assist in answering what is going on in the internal management and control system. Information about the management and control system retrieved in this way is only a subset of all activities that is ongoing inside the company, but it can still provide an insight to the built-up of the internal control system.

3.7 Quality criteria

The studied sustainability reports are not produced with the intention to be used in research. This means that they are non-reactive, meaning have not been subject for influence, which increase the validity of the research (Bryman & Bell 2015). There are however other areas that needs to be taken into consideration when using documents as source for data. Scott, J. (1990) has highlighted four criteria's to be taken into account when assessing quality of documents; authenticity, credibility, representativeness and meaning.

The sustainability report, included in the Annual Reports, and GRI index used in the study has been downloaded from each selected company web page and thereby fulfils the criteria of genuine origin.

Credibility refers to what extent a document is free from distortion and free from errors (Scott 1990). Published sustainability reports are not subject to the same regulations and audit requirements like financial statements. Even if all companies in the study use GRI as reporting framework this still gives each company flexibility to choose which information and performance indicators to use (chapter 2.4). The reports can therefore not be seen as an objective source of facts. What is included in the reports is dependent on many factors and decisions by individuals inside the company. It is therefore a risk that the company's selection of information provides a more positive picture of the actual situation which can lead to distorted information. The study examines how the performance indicators correspond to an expected industry baseline and if accounting postulates have been used to provide the reader a possibility to understand the base of the reporting. The question of credibility can therefore be seen as being a part of the research to fulfil the aim of the study.

Representativeness is a question of assessing if a document is typical of its kind in order to represent all relevant documents (Scott 1990). The selected sustainability reports use the same standard framework. However, as already mentioned, the structure and content can still differ between companies, which is one of the challenges with sustainability reporting. By narrowing the selection of companies using the five-selection criteria described in section 3.3 the representativeness has increased within the area of selection. Still, just as in the question of credibility the criteria of representativeness can be seen as being a part of the research area.

The criteria meaning refers to if the document brings clarity and comprehensibility for the researcher (Scott 1990). This study uses two coding schedules when analysing the content in the sustainability reports order to bring clarity of the text. However, the meaning of a document can also be assessed from the perspective of the researcher (Scott 1990). The criteria's used for creating the coding schedule have been made in order to minimize this impact (see section 3.6). A content analyses includes an element of interpretation when coding the text, which poses a challenge to both the validity and reliability of the analysis (Drisko & Maschi 2016). In order to increase the internal validity and external reliability the creation of the coding categories in coding schedule 1. is based on the GRI performance indicators, BREF documents and SGU guideline. For coding schedule 2 it is based on the defined accounting postulates. Examples of how interpretations have also been provided in coding schedule 1. have been provided in section 3.6, in order to increase the reliability of the analysis.

Triangulation has been used in this study since both a quantitative and qualitative method was used (section 3.1). Triangulation can also be used if using more than one source of data within one study. This enables cross checking of findings and can increase the credibility of the study (Bryman & Bell 2015). A useful additional method would have been to do interviews with people involved in the creation of sustainability reports in the selected companies. This would have provided insights into whether or not the findings, based on an external view of the company, could be verified. This lack of cross checking is a limitation of the study but interviews were not possible to conduct due to Covid 19.

External validity refers to what extent the findings can be generalised (Bryman & Bell 2015). The generalisability in this study is impacted by the method for selecting the samples. It was done based on a number of criteria's instead of a random selection. All three industries were selected due to highly negative impact on the environment and even if not a general conclusion across all companies can be drawn it still provides an insight to the area of problem.

4 Empirical findings and analyses

This chapter starts with identifying the environmental impact baseline for each industry and the corresponding GRI indicators. Detailed information about each indicator can be found on www.globalreporting.org. The next section presents data from the studied companies and the aggregated environmental strategies per industry. Detailed information about each company and its strategies can be found in Appendix 1. The last part of the chapter presents the empirical findings and analyses of the data. The findings are presented per industry and a comparison is made between them. The detailed findings per company is presented in Appendix 2.

4.1 Environmental impact baseline per industry and GRI indicator

The environmental impact baseline for each industry and the related GRI indicators are identified in this section.

4.1.1 Forest and paper industry

The forest industry contributes in a positive way to the climate by binding CO₂ in the forest. A sustainable forestry however requires that consideration is taken to biodiversity and that harvested forest is replaced by new forest. Another important climate challenge for the forestry is transports. In Sweden the forestry is the country's largest purchaser of transports (Von Essen, M., 2018). In Sweden, 6% of the total emission of greenhouse gas (GHG) emissions in 2018 came from the pulp-, paper- and printing industry (Naturvårdsverket, 2019).

The environmental impact is based on the BREF document (section 2.3.4) for the Paper and Pulp industry (European IPPC Bureau).

- *Fuel and energy use.* The industry is very energy-intensive. The most important resource for paper manufacturing is however biomass, which is expected to be CO₂ neutral. Since the production requires a high level of energy the focus on increasing energy efficiency and reduce consumption is needed.
- *Water use.* Water is one of the main components in the production. Cleaning of the water and reduction of consumption is of high importance. The main concern is the potential environmental hazard from the use of chlorine in the bleach plants.
- *Emissions to air.* Because of the need for heat and power, most pulp and paper mills operate on-site power plants, which contribute to the industrial emissions. The key air emissions are dust, nitrogen dioxide and sulphur dioxide.
- *Solid waste.* Waste is normally sent to landfills.
- *Odour and noise*
- *Transport.* Since the raw material is usually located at far distance from the end markets and thus requires considerable transport.

Based on above environmental challenges the following GRI indicators are expected to be reported in the sustainability reports of the Forest and paper industry.

- GRI 301 – Materials
- GRI 302 – Energy
- GRI 303 – Water and effluents

- GRI 304 – Biodiversity
- GRI 305 – Emissions
- GRI 306 - Effluents and waste

4.1.4 Mining industry

The mining industry is classified as an environmentally hazardous industry in Sweden (SGU, 2018). The major environmental impact is contamination of water, air and land with toxic by-products (Ranängen and Lindman, 2017). Of the total emission of greenhouse gas (GHG) emissions in Sweden in 2018 19% originated from the mining industry (Naturvårdsverket, 2019).

Mining requires a license to operate which is granted by the authorities. The environmental criteria's that is used when assessing a license to operate is used as the expected environmental impacts of the mining industry in this study (SGU, 2016).

- *Water - discharges* to the ground and surface (metals, sulphate, phosphor, nitrogen and chemicals) Another impact can be changes of the water temperature locally.
- *Waste* from mining (tailings, gangue, drill cuttings)
- *Air emissions* (CO₂, nitrogen dioxide, carbon monoxide, ozone, benzene, arsenic, lead, cadmium and nickel)
- A requirement to *reset of the environment* after the end of the life cycle of mining
- Ensure safety of ponds
- Protection of species

Based on above environmental areas the following GRI indicators are expected to be reported in the sustainability reports in the mining industry.

- GRI 301 – Materials
- GRI 302 – Energy
- GRI 303 – Water and effluents
- GRI 304 – Biodiversity
- GRI 305 – Emissions
- GRI 306 - Effluents and waste
- MM1 - Biodiversity – Mining
- MM2 - Biodiversity – Mining
- MM 3- Effluents and waste – Mining

4.1.5 Steel industry

The steel industry is a large contributor to the GHG emissions in the world (Fruehan 2009). The industry accounts for 21% of the total industrial CO₂ emissions within EU (Shatokha, 2016), In Sweden it is the largest producer of GHG emissions in the industry sector. 34% of the total GHG emissions came from this sector in 2018 (Naturvårdsverket 2019).

The environmental impact of a steel industry is based on the BREF document (section 2.3.4) for Iron and Steel production (European IPPC Bureau).

- *Energy.* Energy consumption in steel production is considerable, which generates CO₂ emissions.

- *Other emissions to air.* Energy management in the steel industry aims to distribute and use process gases and purchased fuels. The gases used cause emissions of Nitrogen Oxide (NO_x), Sulphur Dioxide (SO₂).
- *Dust emissions.* Storage and handling of large quantities of solid materials can give rise to significant releases of dust, which includes metals and hydrocarbon
- *Water and waste water management.* Water plays a major role in the production processes. It is used for example used for direct and indirect cooling, gas cleaning, scale breaking and washing operations including waste gas cleaning.
- *Management of production residues.* The steelmaking process produces a wide range of residues. A big part can be recovered but some parts have no economic use and disposal is done by landfilling.
- *Local soil pollution*
- *Noise*

Based on above environmental areas the following GRI indicators are expected to be reported in the sustainability reports in steel industry.

- GRI 301 – Materials
- GRI 302 – Energy
- GRI 303 – Water and effluents
- GRI 304 – Biodiversity
- GRI 305 – Emissions
- GRI 306 - Effluents and waste

4.2 Industry strategies and GRI indicators

This section presents the strategies per industry. They are based on the strategies presented by each of the selected companies. The detailed presentation per company and company strategies can be found in Appendix 1.

4.2.1 Forest and paper industry

The environmental strategies for the forest and paper industry presented are based on the strategies communicated by Billerud Korsnäs, SCA and Holmen. The strategies mentioned by the three companies has been counted and compared. The strategies are presented in a hierarchic order where the strategy that is mentioned by most companies is presented first. The number of companies mentioning each strategy is within brackets.

- Minimising fossil carbon dioxide emissions in the value chain (3)
- Reusable and renewable products (3)
- Renewable energy (2)
- Minimize emissions and waste (2)
- Biodiversity (1)

Expected GRI indicators, in hierarchical order, to be reported are:

- 1 GRI 305 Emissions (3)
- 1 GRI 301 Materials (3)
- 2 GRI -302 Energy (2)

- 3 GRI 306 Effluents and waste (2)
- 3 GRI-304 Biodiversity (1)

In comparison to the industry baseline, presented in section 4.1.3, the environmental strategies include the same areas and GRI indicators except for GRI 303- Water and effluents. Individual companies however do not recognise all their actual environmental impacts in their strategies. Emissions and materials are included in all companies' strategies while biodiversity is only included in the SCAs environmental strategy.

4.2.2 Mining industry

The environmental strategy for the mining industry is based on the communicated strategies by Boliden and LKAB. LKAB has communicated strategies for several specific areas while Boliden's communicated strategies can be interpreted as they take a more overall responsibility for the environmental impact. Boliden mentions that their strategy "constant improvements" includes "minimize environmental impact" and "taking clear environmental responsibility".

The below strategies show each of LKABs strategies and Bolidens overall environmental strategy is mentioned separately. There is no ranking in the list.

- Focus on recycling
- Carbon neutral operations
- Environmentally neutral use of water
- Environmentally neutral use of energy
- No impact from emissions on our surroundings.
- Safeguard biodiversity
- Overall environmental responsibility

Expected GRI indicators to be reported including the specific indicator for mining (MM1, MM2 and MM3) are:

- GRI 301 Materials
- GRI -302 Energy
- GRI- 303 Water and effluents
- GRI-304 Biodiversity
- GRI 305 Emissions
- GRI 306 Effluents and waste
- MM1 - Biodiversity – Mining
- MM2 - Biodiversity – Mining
- MM 3- Effluents and waste – Mining
- Overall environmental responsibility

Compared to the GRI indicators presented in the section 4.14, where the environmental baseline for the mining industry was identified, the environmental strategies and indicators are in line with the baseline.

4.2.3 Steel industry

The environmental strategies for the steel industry are based on the strategies communicated by Sandvik, SSAB and Höganäs. In the same way as for the forest and paper industry the

strategies mentioned by the three companies has been counted and compared. The strategies are presented in a hierarchic order where the strategy that is mentioned by most companies is presented first. The number of companies mentioning each strategy is within brackets.

- Minimise used of fossil free production (3)
- Circular materials (3)
- Energy efficiency/ Increasing the use of renewable energy (2)
- Water and effluents (2)
- Effluents and waste (2)

Expected GRI indicators, in hierarchical order, to be reported are:

- 1 GRI-305 Emission (3)
- 1 GRI- 301 Materials (3)
- 2 GRI 302 Energy (2)
- 2 GRI- 303 Water and effluents (2)
- 2 GRI -306 Effluents and waste (2)

Compared to the industry baseline for the environmental impact, presented in the section 4.1.,5 the industry strategies include the same areas, except for GRI 304- Biodiversity. SSAB is aligned with all the other categories in the industry baseline, while both Sandvik and Höganäs is partly aligned.

4.3 Empirical findings and analysis of performance indicators per industry

The industry baseline and the average points per industry is presented and analysed in this section. Each company specific achievements can be found in Appendix 2. A comparison between the communicated environmental strategies and the reported performance indicators is also presented and analysed.

4.3.1 Forest and paper industry

The industry baseline for the Forest and paper industry is 27 points. Data is expected to be reported in 6 categories. The industry achieved on average 5.2 points (Table 5)

Table 5. Forest and Paper industry - reported indicators compared to expectations

Forest and paper industry	Expected reported GRI indicator Forest and Paper industry	Baseline	Actual reported indicators
GRI 301	Materials	3	0,5
GRI 302	Energy	5	1,0
GRI 303	Water and effluents	3	0,2
GRI 304	Biodiversity	4	0
GRI 305	Emissions	7	2,7
GRI 306	Effluents and waste	5	0,8
Total		27	5,2

Biodiversity is not reported by the industry at all. Biodiversity is required for a sustainable forestry, which was mentioned in section 4.1.1 SCA is the only company that includes this category as an environmental strategy but the company did not choose to report it as a performance indicator.

Emissions is the category that is most extensively reported. Most performance indicators are reported in this category. Compared to the baseline of 7 points only 2.7 points is however achieved. The reduction of emissions is included in the environmental strategies by all companies. SCA communicates the most ambitious strategy in terms of a fossil free value chain but the company reports the least number of indicators in this category, SCA receives only 2 points in the emission category despite its ambition (specified data per company is available in Appendix 2).

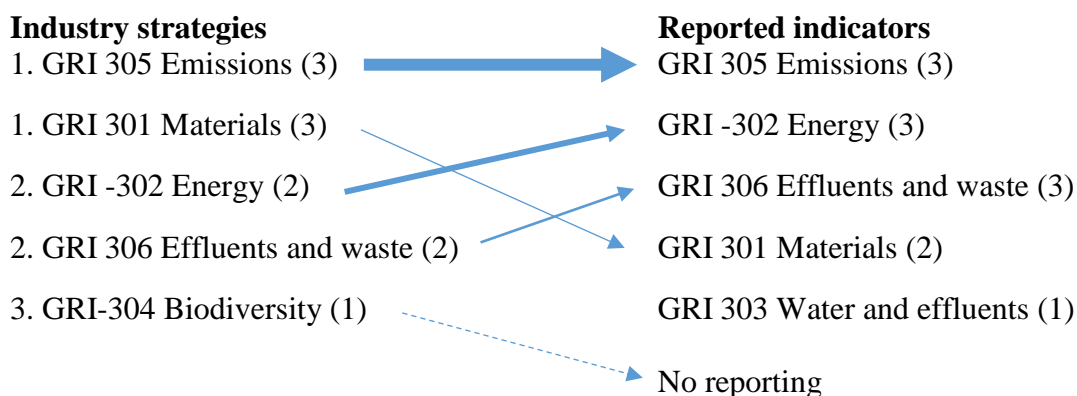
The production of paper and pulp is *energy* intensive so the expectation was to find performance indicators in this area. Both SCA and Holmen mentions renewable energy in their environmental strategies. Total points achieved for the industry in this area is however only 1 point compared to the 5 points in the baseline. Each company includes performance indicators for this category. Billerud Korsnäs that did not mention this as a specific topic in their strategy reported in the end more indicators than the other two companies.

Water usage is one of the main components in the production of pulp and paper. Cleaning of the used water is of high importance just as well as reducing the total consumption. None of the companies however mention this as a part of their environmental strategy. Total achieved points achieved is 0.2 for the industry due to the fact that Billerud Korsnäs report indicators in this category.

The GRI category *Effluents and waste* includes water discharge, disposal of waste, hazardous waste and spills. It was expected to see performance measure both in relation to water discharge and waste from an industry perspective. Water, as already mentioned, is not part of any of the company's strategies and when it comes to waste only SCA mentions minimising of waste in its strategy. Total average points achieved in this category was 0.8 points compared to 5 points in the baseline. Waste is partly reported by each company but it is not in line with the GRI specifications. Water discharge is partly reported by Billerud Korsnäs and Holmen but not SCA.

The area *Renewable products* is highlighted in each of the company's environmental strategies. But when it comes to reporting performance indicators for renewable or recycled *material* used in the production the outcome is that the industry receives only 0,5 points compared to 3 points in the baseline.

When comparing the categories in the industry baseline with the communicated environmental strategies in the industry all the industry baseline categories were recognised in the strategies, except for the use of water. In section 4.2.1 the environmental strategies for the industry is presented in a hierarchy, where the highest ranking represents the strategy which is found in most companies and could then be concluded to be the most important strategy for the industry. When comparing with the actual reported indicator the ranking is different. Below is a comparison between industry strategies and reported indicators. The number of companies reporting the indicators is shown within brackets. The different thickness of the arrows illustrates to what extent the indicator has been reported, meaning how many indicators was included and to what degree they fulfilled the GRI requirements.



Emissions (GHG) is one of the most highlighted strategies in the industry. Emissions is also the category that is most extensively reported by all three companies. When comparing the other strategic categories with the actual reported indicators there are differences. Some strategic categories, energy and effluents and waste, were not included in all the companies communicated strategies but are still included by all companies in the reported indicators. Other strategic areas, are not included in the final reporting. Materials were downgraded and biodiversity was completely excluded. Water and effluents are not included in any of the company's strategies but is included in the actual reporting for one company. Overall, there is not a clear link between the communicated strategies, what is actually reported and to what extent it is reported.

In summary, the potential negative environmental impact for the forest and paper industry comes from fuel, energy and water use, emissions to air, solid waste, transport and negative impact on biodiversity. These are the areas that the industry is expected to report on from an environmental point of view which is reflected in the industry baseline in this study. The expected baseline for the forest and paper industry was that the industry would report data in 6 GRI performance categories and, if all indicators were reported, show a total of 27 points. When reviewing the reports for the industry data is provided in 5 categories and the score is on average 5.2 points. Most indicators were reported in the category emissions and none in the category biodiversity. Only 2 categories receive a score of 1 or higher. On average the other indicators score between 0.2 and 0.8. None of the GRI categories includes all related indicators. According to the GRI Core reporting option a company should report the minimum requirements in order for stakeholders to understand the organisation and its impact. For at least one topic specific closure all related indicators should be reported. Reduction of GHG emissions is one of the environmental strategies that is mentioned by all companies and the most extensive reported category. Still, on average the industry only achieves 2.7 points in this category compared to 7 points expected from the baseline.

The companies in the forest and paper industry choose to report performance indicators in different ways compared to their communicated strategies. The categories in the environmental strategies are in line with the expected baseline but the industries communicated environmental strategies and what is prioritised and reported in the actual reporting differs. From a total industry perspective water usage, water discharge and waste are factor that potentially can give a negative impact for the environment but those areas are not taken into much account in the reporting.

Looking from a company perspective (for details see Appendix 2) Billerud Korsnäs and Holmen report indicators both in categories that is in line with their strategies and in other categories. SCA, on the other hand, with the most ambitious and extensive environmental

strategy, report less performance indicators and do not complete them for all their strategies. In general companies reports only one performance indicators in each category even if it is highlighted as a company strategy. The difference of reporting highlights one of the issues with GRI. Despite that all companies use GRI as standard framework they do not always include the same indicators and do not report indicators to the same extent. According to GRI each business needs to evaluate their level of materiality but this make it difficult to compare between the companies even within the same industry.

4.3.2 Mining industry

The industry baseline for the mining industry is 30 points. Data is expected to be reported in 11 categories. The industry achieved on average 11 points Data is reported in each expected category, except for one of the specific mining GRI indicators MM2 (Table 6).

The two companies in the study however show a wider variety in their reporting of GRI environmental indicators. The two companies were estimated to report GRI indicators in eleven categories both from an industry and company strategy perspective (for details by company see Appendix 2). Boliden reports indicators in nine categories and LKAB in six categories. The difference between the companies shows as well in how many points each of them achieves. Boliden achieves 16.5 points in total while LKAB receives 5.5 points in total. Boliden reports more performance indicators in each category and shows a higher degree of transparency

Table 6. Mining industry - reported indicators compared to expectations

Mining industry	Expected reported GRI indicator Mining industry	Baseline	Actual reported indicators
GRI 301	Materials	3	1,3
GRI 302	Energy	5	1,5
GRI 303	Water and effluents	3	1,0
GRI 304	Biodiversity	4	1,8
GRI 305	Emissions	7	2,5
GRI 306	Effluents and waste	5	1,8
MM1	Biodiversity	1	0,5
MM2	Biodiversity	1	0,0
MM3	Effluents and waste	1	0,8
Total		30	11

The most complete category, in terms of numbers of indicators reported and completed in accordance with the GRI standard requirements, is *emissions*, 2.5 points compared to the 7 points in the baseline is achieved for the industry. Both companies prioritise this area. LKAB is mentioning this area as a part of the companies’ strategies while it can be interpreted that Boliden includes it in the overall strategy in which “minimising the environmental impact” is mentioned.

Water usage and *discharge* can have a negative environmental impact from the operations of mining. LKAB highlight this area in its environmental strategy while for Boliden it again can be interpreted that the area is included in the overall environmental responsibility. Boliden reports data for each indicator in this category while LKAB reports nothing.

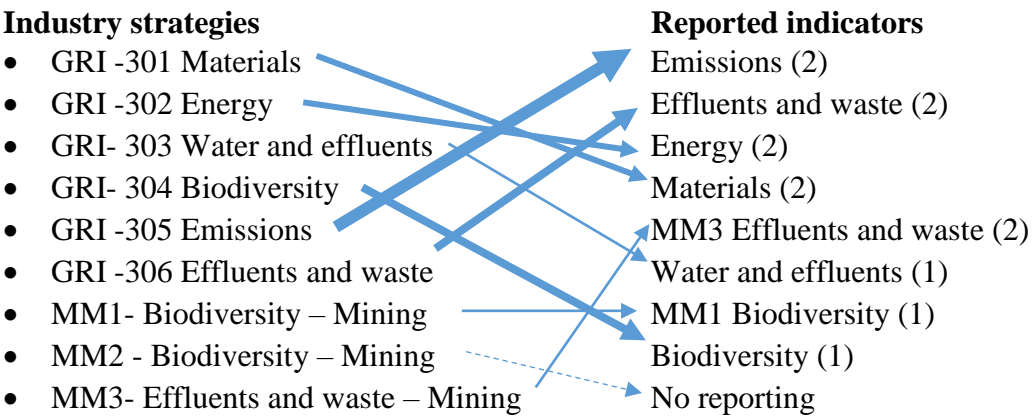
Waste from mining in the form of tailings, gangue and drill cuttings is another important area that needs to be taken into consideration. The GRI reporting category Effluents and waste is also highlighted as a specific industry category, which mining companies needs to include in the reporting. LKAB only report significant spills in this area and reports partly the GRI indicator MM3 (overburden, rock, tailings, and sludges and their associated risks). Boliden on

the other hand achieves 2.5 points compared to 5 points in the baseline in the general GRI category for Effluents and waste and fully completes the performance indicator MM3.

Biodiversity is also highlighted as a specific important category for the mining industry in GRI to be followed up and reported. LKAB mentions this area clearly in its strategy while Boliden can be seen to include it in its more overall environmental strategy. However, again, LKAB reports nothing in this category while Boliden achieves 4.5 points compared to the 6 points in the baseline (GR1 304, MM1 and MM2).

LKAB and Boliden also differs in the way they inform about their environmental strategies. LKAB inform about very specific environmental strategies in its sustainability report, which are in line with the baseline for the environmental impact, while Boliden communicated a more generic strategy with an overall environmental strategy. However, despite the detailed strategies LKAB choose to not always include or report to a low extent performance indicator that are in line with the them. Section 4.2.2 shows the environment strategies for LKAB and the strategy for Boliden is included as overall environmental responsibility. Boliden can be said to incorporate all the same environmental strategies since they take an overall responsibly. This means that there is no ranking between the categories and the assumption is that all strategies are equally valued. Below is a comparison between the communicated strategies and what was actually reported. The thickness of the arrows represent to what extent indicators has been reported, meaning how many indicators was included and to what degree they fulfilled the GRI requirement. The right-hand list shows a hierarchy with the number of companies reporting the category within brackets.

Emissions (GHG) is the most extensive reported category for both companies and is therefore on top of the list. In addition, five other categories are been reported for both companies while 3 categories are only reported by one company and one category (MM2 Biodiversity) is not reported at all.



Even if both companies report indicators in the majority of the categories Boliden shows more transparency when including more indicators in the majority of categories. LKAB reports only reports the indicators partly, according to GRI standards, or only provide date for one indicator per category. According to the GRI special sector guidelines the additional indicators should be included for at least one material. Boliden complies with this request in the category Biodiversity, while LKAB excluded Biodiversity completely. Effluents and waste is the other GRI sector specific category to be included. In this areas Boliden reports effluents and waste to the same extent as emissions while LKAB receives a low score.

In summary, the potential negative environmental impact from the mining industry comes from water use and water discharge, waste and effluents from mining, air emissions, energy use and a negative impact on the biodiversity. These areas build up the expected environmental baseline for the mining industry. The baseline for the mining industry is 9 reporting categories with a max score of 30 points. The mining industry in total reported data in all categories and achieved on average 11 points. The category including most reported indicators is emissions, where 2.5 points compared to the 7 points in the baseline is achieved. In five other categories (effluents and waste, biodiversity, energy, materials and water and effluents) the industry reports on average more than 1 indicator per category.

The mining industry shows one of the challenges with the GRI framework. It provides an opportunity for too much flexibility and companies can choose to report in different ways. This has a large negative impact on the comparability level between companies but also between industries. It is difficult to conclude a picture of the industry since the two companies shows a big variance. To be noted is that Boliden who provides a more general environmental strategy where the focus is to take responsibility for the overall environment provides a much more detailed and transparent view of what they measure and achieve in the area than LKAB who communicated a more detailed strategy in each area.

Looking at the industry specific indicators Boliden and LKAB choose to assess the materiality level differently. While Boliden comply with the GRI framework LKAB only partly does. This again shows on the high flexibility level of GRI when companies can choose to make other assessment than GRI regarding a specific sector guideline. For an external reader of sustainability reports it makes comparison between companies in the same industry difficult.

4.3.3 Steel industry

The industry baseline for the steel industry is 27 points. Data is expected to be reported in 6 categories. The industry achieved on average 7 points (Table 7).

Table 7. Steel industry - reported indicators compared to expectations

Steel industry	Expected reported GRI indicator	Baseline	Actual reported indicators
	Forest and Paper industry		
GRI 301	Materials	3	0,5
GRI 302	Energy	5	1,2
GRI 303	Water and effluents	3	1,5
GRI 304	Biodiversity	4	0,0
GRI 305	Emissions	7	3,3
GRI 306	Effluents and waste	5	0,5
Total		27	7,0

The GRI category *Biodiversity* is excluded in the reporting. It was expected category that the areas would have been included due to the nature of the industry and the potential negative impact on its surroundings, local soil pollution, noise and emissions (section 4.1.3). This area is however not mentioned as a strategic area for any of the selected companies.

The most complete category, in terms of numbers of indicators reported and completed in accordance with the GRI standard requirements, is *emissions*. 3.3 points compared to 7 points in the baseline is achieved in this category. All companies mention this area as a part of their environmental strategy. This is in line with the fact that the industry is the largest producer of GHG emissions in the industry sector in Sweden. SSAB has the ambition to become the first fossil-free steel company in the world and the company completes the majority of the indicators

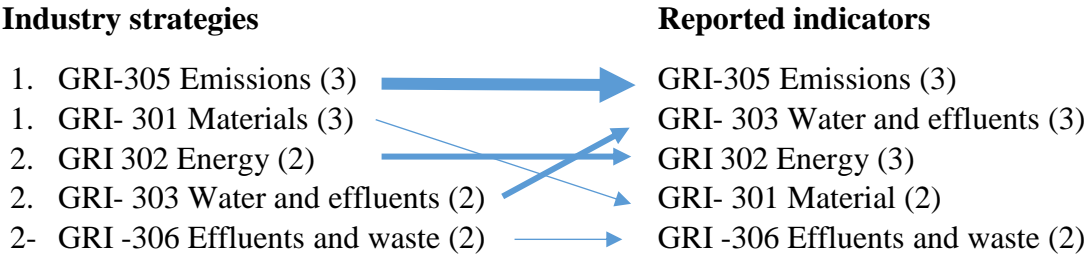
in this category and achieves 5 point compare to 7 points in the baseline (for company specific result see Appendix 2).

The driver of the emissions is the consumption of *energy*. In this area however, the industry only manages to achieve 1.2 points out of 5 points in the baseline. Energy is included in the strategy for each company but the reporting is only done partly in accordance with GRI, which is the reason for the lower score.

Water and waste management also plays an important role in the steel production. Despite this the industry shows low scores in both categories, Water and effluents and Effluents and waste, compared to the reporting done for emissions. Both Sandvik and SSAB mention the areas as part of their strategies while Högånäs does not. The industry achieves 1.5 out of 3 points in the baseline. Water and Effluents and on average 0,5 points out of 5 in the category Effluents and waste.

The use of renewable materials and a circular business model are strategies mentioned by the all three companies but when it comes to reporting the performance score is low in the category material. In this category the companies should report materials used in production and how much that comes from renewable and recycled materials. On average the industry receives 0.5 point out of 3 points in the baseline.

When comparing the actual reported indicators in each category with the prioritised environmental strategies for the industry (section 4.2.3) there are some differences in the ranking. Below is a comparison between industry strategies and reported indicators. The number of companies reporting the indicators is shown within brackets. The different thickness of the arrows illustrates the different extent of reporting indicators, meaning how many indicators were included and to what degree they fulfilled the GRI requirements.



Emission (GHG) is number one both from a strategic perspective and the numbers of indicators reported by all companies in the industry. Some categories, energy and water influents, are reported by more companies reported indicators than they had communicated in its strategies. One category, materials, is downgraded and is not reported by all companies even if it is mentioned in the strategy each company. There is not a clear connection between communicated strategies and actual reported strategies.

Emissions (GHG) is the big driver in the reporting for all the companies. The steel industry. Almost half of all reported indicators arrives from this category. The steel industry is a largest producer of GHG emissions both globally and in Sweden and there is a pressure on the industry to reduce its emissions. This is also the strategic focus in all three companies. SSAB even has the ambition to become the first fossil-free steel company in the world. Still the industry does not complete all indicators in this category. 3.3 points of 7 points in the baseline is achieved.

SSAB receives the highest score and completes the majority of the indicators in this category and achieves 5 point out of 7 points in the baseline.

Apart from emissions (GHG) the industry also has environmental impacts in other areas, which is reflected in the environmental strategies. Use of energy and water and effluents are also reported by all companies but to a lower extent, in terms of number of indicators, compared to emissions. Waste management plays an important role in the steel production and has a potential negative impact on the environment. It is recognised in the strategies but is only partly reported according to the GRI standards. One aim is that reported sustainability measurements is to enable stakeholders to assess the companies impacts and issues. From the created baseline perspective three areas out of five scores over 1 point with the major focus on one indicator. All companies in the three industries seems however in agreement about which categories that are material. They report to a quite similar extent in all three categories, which is positive from a comparability point of view.

In summary, the potential negative environmental impact from the steel industry comes from energy consumption, emissions to air, emissions of dust, usage of water, water discharge, production residues and local soil pollution, providing negative impact in biodiversity. The expected baseline for the environmental impact for the steel industry is to incorporate performance indicators in 6 categories, which corresponds to a maximum of 27 points in the baseline, when data is provided for each indicator. On average the industry reports data in 6 categories and achieves on average 7 points. Most indicators were reported in the category emissions and none in the category biodiversity. The indicators reported regarding emissions receives a score of 3.3 points, so almost half of the total points for the sector. Water and effluents and energy received a score of 1.2 and 1.5 on average. And the other categories were only partly reported.

The focus in the industry both in terms of strategy and in terms of reported performance indicators is emissions. Energy and water and effluents is reported to the same extent by all three companies, with a score over 1 and all the rest indicators are scores below 1. The steel industry seems to be in agreement with the materiality level from both a strategic and reporting perspective. Still, different indicators were given different prioritisation in the actual reporting compared to the communicated strategies

4.3.4 Summary and Comparison between industries

All three industries show quite a significant deviation between the expected industry baseline and the actual performance score for the industry. This is despite that the majority of the environmental strategies in each industry is in line with the baseline for each industry. When comparing the strategic prioritisations for each industry with the actual reporting it however differs for all industries. Communicated strategies is not always reported to the same extent as expected. Performance indicators are in some cases included even if not mentioned in the environmental strategies and in some cases, they are excluded. Different prioritisations are also given to different categories in terms of prioritisation. There is overall not a clear link between communicated environmental strategies, what performance indicators are reported and to what extent they are reported.

The GRI category *Emissions (GHG)* is the category that is reported most extensive for all industries and seems, from this perspective, be regarded as the most important environmental area for all three industries. All the industries report more indicators in this category and thus provides a more complete picture about their performance in this area. All companies in the study has included emissions as one of their environmental strategies. Half of the reported

indicators in the forest-, paper-, and steel industry origins from this category. The same finding applies for LKAB. Boliden however, which reports indicators to a much wider extent than any of the other companies, does not show this pattern and provides a more balanced reporting.

Energy usage is another important environmental factor for each industry and it is mentioned in the majority of the company's strategies. Still, compared to emissions, the overall score is lower than for emissions for each industry. So, despite that this is communicated as environmental strategy the number of performance indicator reported is low and the score is on average 1.2 points out of 5 in the baseline across the three industries.

The GRI category that is excluded by almost all companies and industries is *Biodiversity*. Most companies in the study does not include this as a strategy and therefore does not include this area when reporting performance indicators. Boliden is the exception. Boliden's environmental strategy differs from all the other companies since they take an overall responsibility for the environment and the company reports extensively in the category biodiversity.

4.4 Empirical findings and analyses of accounting postulates

The empirical findings are reported and analysed for each industry but with a reference to the selected companies. Each company specific achievements can be found in Appendix 2

4.4.1 Forest and paper industry

Going concern

A number of projects aiming to improve the environmental impact of the companies are mentioned. In some cases, the amount for the investment is mentioned in connection to the description of the project but this is not always the case. The investment and related depreciation cannot be found in a separate note where the projects are highlighted.

Accounting Unit

There is unclarity regarding what is included in the sustainable area of responsibility is in the forest and paper industry. The companies define the area of direct control either in a narrowed way in which they include all group companies for which the company has operational control in the sustainability report (Billerud Korsnäs and SCA) or is including all companies within the group (Holmen). As indirect control all selected companies report GHG emissions for both scope 2 and scope 3. Environmental screen of new suppliers and potential negative environmental impact from the supply chain is partly reported by Billerud Korsnäs and Holmen but not SCA. On the other hand, none of the companies have chosen to include energy consumption outside the organisation, meaning upstream or downstream activities that the company can influence, for example transportation. The area of responsibly per company is summarised below:

Billerud Korsnäs: All companies where the company has operational control + energy indirect scope 2 and 3 + environmental screening of new suppliers

SCA: All companies where the company owns more than 50% of shares + energy indirect scope 2 and 3

Holmen: All group companies + energy indirect scope 2 and 3 + environmental screening of new suppliers

Accounting period

Recycled products are an important part of the forest and paper industry. Several projects are mentioned to improve even more in this area. There is however no evaluation of the usage of the products over time included. There is no lead time mentioned how long the time span is from production of the raw material to the time the products will go into a reuse or recycling stage.

Monetary unit

This postulate related to section 4.3 For the total industry 5 performance indicators out of 6 possible categories are reported but the total score is low compared to the expected max point of the industry. The measure of units is in accordance with GRI requirements except for the case of energy consumption where the GRI standard is joule but both Billerud Korsnäs and Holmen choose to report in GWH and SCA reports a mix of both. A different measurement used than what is provided in the standard have an impact on the comparability between companies. There is no risk and an opportunity factor reported in relation to the performance indicators

4.4.2 Mining industry

Going concern

Several projects us mentioned which aims to improve the environmental impact of the companies. The investment amount is sometimes mentioned in connection to the description of the project but this is not always the case. The investment and related depreciation cannot be found in a separate note where the projects are highlighted. As an example, LKAB has a cooperation with SSAB regarding the HYBRIT project but no investment cost is mentioned.

Accounting Unit

There is the same kind of unclarity regarding what is included in the sustainable area of responsibility is in the mining industry as in the forest and paper industry. Boliden include the operation units which represent the significant environmental impact of the company while LKAB includes all companies in the group. GHG emissions for scope 2 are included for both companies but no upstream or downstream energy consumption. Boliden does not report any environmental assessment or negative impacts in the supply chain while LKAB partly does. The area of responsibly per company is summarised below:

Boliden: Boliden's eleven operational business units which represent the company's environmental impact + energy direct scope 2

LKAB: All companies in the group + energy direct scope 2 + negative environmental impacts in the supply chain

Accounting period

LKAB does not report anything in relation to what extent the products are recycled. Boliden is focused on recycling of batteries and copper. As for the forest and paper industry there is no evaluation of the usage of the products over time included. There is no lead time mentioned how long the time span is from production of the raw material to the time the products will go into a reuse or recycling stage.

Monetary unit

This is related to section 4.3 The variance between the reporting level between Boliden and LKAB varies to a large extent. Boliden reports 8 GRI categories while LKAB only reports 5 categories out of 9. Boliden also provided indicators to a higher extent than LKAB.

The measure of units is in accordance with GRI requirements except for the case of energy consumption where the GRI standard is joule but both companies choose to report in GWH. A different measurement used than what is provided in the standard have an impact on the comparability between companies. There is no risk and an opportunity factor reported in relation to the performance indicators

4.4.3 Steel industry

Going concern

All three companies mention innovation projects related to the environmental area. SSAB is especially mentioning the HYBRIT project and the investment costs that has been done so far but the investment is not mentioned in any of the investment notes. The other companies sometime mention some investments cost in relation to some of the projects but not for all. No depreciation cost is reported.

Accounting Unit

Same kind of unclarity regarding what is included in the sustainable area of responsibility appear as in the Forest and paper and in the mining industry. All three companies include different extent of the areas of responsibility. An overview of the boundaries is summaries below per company.

Sandvik: All companies in the group + energy indirect scope 2 and 3

SSAB: All companies in the group + energy indirect scope 2 + negative environmental impact in the supply chain.

Höganäs: All companies in the group

Accounting period

Both Sandvik and SSAB is involved in working together with their customers to understand the life cycle and minimize waste. Sandvik has a goal to reach 90% recycled products. There is however not yet any measurements provided in the area.

Monetary unit

This is related to section 4.3 For the total industry 5 performance out of 7 possible categories are reported but the total score is low compared to the expected max point of the industry. The measure of units is in accordance with GRI requirements except for the case of energy consumption where the GRI standard is joule but Sandvik and SSAB choose to report in GWH. There is no risk and an opportunity factor reported in relation to the performance indicators.

4.4.4 Summary and Comparison per industry

Going concern

All industries show the same pattern. A number of projects aiming to improve the environmental impact of the company are mentioned. Sometimes the amount for the investment is reported but not all projects are covered. The investment amounts and related depreciation is not mentioned in relation to the investment's notes.

Accounting Unit

All industries show the same kind of unclarity when it comes to the sustainable area of responsibility. The area of control is wider in some respects like GHG emissions from scope 2 and 3 but more narrowed when it comes to reporting any potential energy consumption in the upstream and downstream area. And in addition, screening and follow up of environmental

impact in the supply chain area is sometimes included or not included. Since the companies report in different ways in this area comparison between companies and industries is difficult to achieve. Table 8. shows a summary of the different units included by company and industry.

Table 8. Reported units per company and industry

Area of responsibility/unit	Company	Industry
<i>Company</i>	All	All
<i>All group companies</i>	Holmen, LKAB, Sandvik, SSAB, Höganäs	Forest and paper, mining, steel
<i>Operational control companies</i>	Billerud Korsnäs, SCA	Forest and paper
<i>Companies with the major environmental impact</i>	Boliden	Mining
<i>Energy Scope 2 suppliers</i>	All except Höganäs	All
<i>Energy Scope 3 suppliers</i>	Billerud Korsnäs, SCA, Holmen, Sandvik	Forest and paper, steel (partly)
<i>Energy Upstream and downstream activities</i>	Not included	Not included
<i>Evaluation of new and existing suppliers</i>	Billerud Korsnäs, Holmen, LKAB, SSAB	Forest and paper (partly), mining(partly) steel (partly)
<i>Recycling activities</i>	Not included	Not included
<i>Client use of products</i>	Sandvik, SSAB	Steel

The area of responsibility affects what information is included and excluded in the sustainability report. The fact that companies and industries differ in what they define as their area of responsibility complicates the comparability between companies and industries when evaluating their performance in the environmental area. Also, within the same company the extent of the responsibility is not all clear. Example SCA included companies in their report for which they have operational control but still they report the energy consumption for both scope 2 and scope 3 suppliers but influencing new and existing suppliers though evaluation is not included. This make it difficult to understand on what ground the sustainability report and the reported numbers are built.

Accounting period

Both the forest and paper industry and the steel industry are focused on recycling of their products. But there is not yet an evaluation of the usage of the products over time includes in their sustainability reports. There is no lead time mentioned how long the time span is from production of the raw material to the time the products will go into a reuse or recycling stage.

Monetary unit

This relates to section 4.3. The indicator reported between the companies and industries varies despite that all companies use the same standards framework. There are recommended unit of measures for each indicator but each company has a flexibility to assess which indicators are relevant for their companies. And even within the same industry it can differ, as shown in section 4.3. This makes it hard to compare the sustainability performance between companies and between industries.

5 Concluding discussion, limitations and future research

In this chapter the findings from previous chapters are discussed in relation to the research questions and the aim of the study. In the following section the empirical findings in relation to the theoretical framework is discussed. The chapter ends with limitation of the study and suggestions for future studies

5.1 How are performance measurements provided?

There is an expectation from stakeholders that companies report their actual environmental impact and takes action in the relevant areas (Rodrigue, Magnan & Boulianne 2013). The content analysis shows that many of the areas where the three industries have an environmental impact is included in the companies communicated environmental strategies. So, from this point the companies fulfils the expectation that stakeholders can have on the companies.

The companies in the three industries provide however performance indicators to a much lower extent than the expected industry baseline. One of the reasons for the big deviation between the baseline and the actual reporting might be connected with the GRI core framework. The requirements for the core option are that the minimum information should be provided in order for stakeholders to understand the nature of the organisation and its material topics. It is required to comply with all reporting requirements for at least one topic-specific disclosure. This is in contrast to the comprehensive option where all standards need to be included. The identification of the material topics is up to each business to assess in relation to strategy and environmental demands (GRI, 2020, GRI standards 101- foundation). This reasoning is in line with the EU directive on non-financial disclosures, Directive 2014/95//EU, which states that non-financial key performance indicators that are relevant to the particular business should be disclosed (European Commission, 2014). This gives a lot of flexibility to companies to choose which environmental areas to include and to what extent they will report them, without any requirements to motivate the reasons for their selection. Only one of the companies in the study, Boliden, fulfils the core option demand to provide all reporting requirements for at least one-topic-specific disclosure.

When comparing, by triangulation, how the reported environmental strategies are transformed into reported performance measurements a clear link is not always found in neither the companies nor the industries. To a varying degree, environmental areas which are not included in the communicated strategies are reported as performance indicators, while environmental strategies that are communicated are not included in the reported indicators.

The majority of the companies and the industries also exhibits a rather narrow focus when reporting performance indicators. The major focus for all three companies and industries when it comes to reporting of indicators is GHG emissions. Almost half of the indicators of the total number of reported indicators are reported in the GHG emissions category for the forest and paper industry, the steel industry and for LKAB. The reason might be that all industries experience a higher pressure in this area compared to the other environmental impact areas. However, to comply with GRI companies should provide performance indicators to the extent that stakeholders understand the nature of the organisation and its material topics. A more balanced reporting is required to fulfil this demand.

When comparing how companies report within the same industry it differs, despite the use of GRI as standard framework. The companies do not always identify the same areas for environmental strategies and even if they do, they might choose to report indicators in those areas or exclude to report on them. In addition, if they report the same performance indicators the extent varies between the companies. This is most obvious in the mining industry where the two companies embrace the same strategic approach but choose different ways to what extent they report the related performance indicators. This is despite that the GRI framework has issued sector specific indicators for the mining industry. The same tendency applies for the forest and paper industry where SCA communicates the most extensive number of environmental strategies but the actual indicators they report differs from the other two companies in the same industry. This shows that the assessment of materiality level differs between companies within the same industry, which goes back to the high flexibility level the GRI core option provides. It makes comparability difficult between companies in the same industry and impossible between industries.

According to Simons LOC a control system is needed to implement and evaluate strategies in a company. The role of diagnostic control systems is to monitor the performance against the strategic targets. The strategic focus in the diagnostic control systems are the defined critical performance variables, which needs to be identified for each strategy and be measured and followed up with related performance indicators (Simons 1995). The empirical findings show that the communicated environmental strategies is not always in line with the reported performance variables. Environmental areas including in the strategies are not always reported and indicators not included in the strategies are reported. There is also an uneven balance between to what extent the indicators are reported, which provides a narrow picture of the strategic achievements. The gap found between the communicated strategies and reported performance indicators raise questions how the critical performance variables have been chosen. An interpretation of reported performance indicators that are not a part of the strategies is that the area is not a prioritised strategic area but still there are activities ongoing in this area. In the opposite way, when environmental strategies are communicated but there are no indicators reported it can be interpreted that there is no actual work ongoing in this area or the outcome is not something the company would like to inform about. Greenwashing researchers has showed that some companies report less about the sustainability work to not be accused for greenwashing (Gatti, Seele & Rademacher 2019). But to not report about negative outcomes can decrease their reliability (Rüdiger & Lülfs 2014). When there is an unclear relationship between communicated strategies and the performance indicators questions are raised about the actual work performed in the company. The identified gap between the communicated environmental strategies and the performance measurements is thereby also identifying a gap in the implementation of the environmental strategies in the management control system.

In summary, the companies in the three industries provide performance indicators to a much lower extent than the expected industry baseline and only one company fulfils the GRI requirement to provide all reporting requirements for at least one-topic-specific disclosure. Reported performance indicators do not show a balanced view of the environmental impact of the companies. The main reporting focus for all three industries is to report on GHG emissions. Despite the use of the same GRI framework the companies choose to prioritise different performance indicators. The flexibility provided by the GRI Core standards is high and as a consequence the assessment of materiality level differs between companies within the same industry. The study also shows an unclarity in the relationships between communicated environmental strategies and reported performance indicators. This gap reveals a deficiency in the implementation of the environmental strategies in the management control system.

5.2 How are accounting postulates used?

From a sustainability perspective **going concern** is the time it takes for the company to achieve sustainability related goal in order to meet its financial and sustainability obligations (Fagerström & Hartwig, 2016). In order to survive from a sustainability point of view companies need to make investments in the environment and in new technologies. All companies in the study mention different kinds of projects that aim to improve the environmental impact for the companies. It ranges from investments to reach a fossil free production to innovation of new products to help customers to decrease the environmental impact. In general, the companies however do not report any costs related to these initiatives. To be able to evaluate going concern related to environmental investments and its impacts for the company's long-term survival information about the investment cost for each project needs to be provided. The company needs to have enough capital to both cover financial and sustainability risks in order to fulfill their commitments regarding the company's sustainability.

Traditional accounting defines the **accounting unit** based on who owns and controls the unit. It is well defined in legal terms and identifies what transaction, obligations and contracts that need to be included in the accounting. Sustainability as a concept however requires a wider scope of responsibility. The accounting unit concept adjusted for sustainability can be said to include all activities where the company has some sort of control over the business. It includes that companies are responsible for sold products over the useful life of the products, including recycling (Fagerström & Hartwig 2016). All the companies in the study show the same kind of unclarity when it comes to the sustainable area of responsibility. The different companies include different extensions of units in the sustainability reports, which is shown in the summary made in table 8. How a company defines its area of sustainability affects what information is included and excluded in the sustainability report. Comparability between companies is not possible when the areas of responsibility is not considered to be the same. It is also difficult to understand the area of responsibility within a company. The same company can show a broad scope when it comes to including energy consumption but a narrower scope when it comes to influence suppliers in the value chain. The unclarity complicates the level of comparability between companies and between industries but also in understanding the boundary level in the individual company. In addition, the unclarity is not in line with the equity theories discussed in section 2.2.2. Even if the different equity theories identify different target groups for the financial statement each of the theories are consistent regarding which groups to include in opposite to the result found in the sustainability reporting in this study.

Traditional accounting is based on a specific time period, normally a year. The **accounting period** from a sustainability perspective differs however from the traditional accounting period since many of the issues relate to long term consequences for the environment. The entire life cycle of a production therefore needs to be included in the assessment of risks and opportunities. Companies in the forest and paper industry and the steel industry are very focused on recycling of their products. But there is not yet an evaluation of the usage of the products over time included in their sustainability reports. There is no lead time mentioned how long the time span is from production of the raw material to the time the products will go into a reuse or recycling stage. The lack of information about the life cycle of the is in contradiction to the SET, presented in section 2.2.2. According to the SET sustainability is built in the organization and therefore the company must take responsibility for sustainability over the full life cycle of the products. When not including the full life cycle in the sustainability reporting the reports are not in compliance with SET.

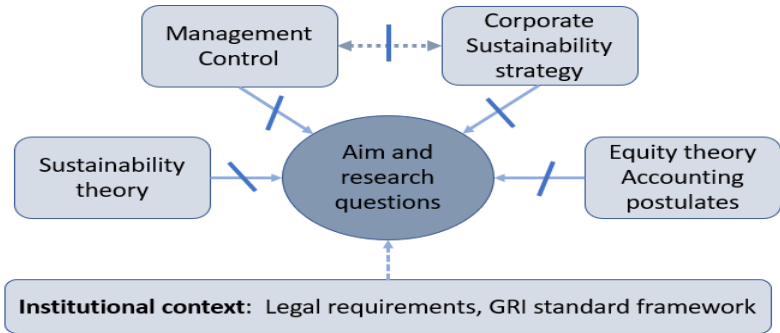
In summary, the companies in the study is not compliant with the adjusted sustainability postulates and the equity theories. Information about capital is missing in relation to the investments, the accounting unit is not clear and differs within companies and between companies, and finally there is no information regarding the products full cycle time.

In the next section the results are analysed based on the a priori model (figure 2.)

5.3 Theoretical model

The empirical findings in relation to the theoretical framework for this study (section 2.1) are summarised in figure 7. The refined theoretical framework shows that the theories used to analyse the empirical data could not be validated when studying the sustainability reports in any area apart from partly in relation to the institutional context.

Figure 7. Refined theoretical framework, a posteriori model



Starting with the *sustainability theory*, it can be concluded that it is not possible to clarify from the empirical results if the studied companies and industries conduct business in an *environmentally sustainable way*. A company can be considered to be environmentally sustainable when it both carry out activities in an environmentally sustainable way and their products or services are produced in an environmentally friendly way (Hódi Hernádi 2012). The identified gaps between the environmental strategies and performance indicators, between the industry baseline and the number of reported indicators and in addition, the ambiguity regarding the company’s sustainability boundaries, results in questions regarding the level of environmental sustainability in the studied companies.

The empirical findings in regards to *management and control systems* and *environmental strategies* have been discussed in previous section 5.1. Based on previous research, the implementation of sustainability in corporate strategies is seen as a starting point for driving operational sustainability performance (Epstein & Roy 2001; Bennett & James 1998). The term strategy is defined in this study as a defined plan which defines the actions the company wants to take in order to achieve its goals (section 2.4). An *environmental strategy*, according to Wijethilake (2017) includes the goal to reduce the size of the company’s ecological footprint by integrating environmental considerations into operations. To implement strategies in an organisation there is a need to have a control system in place in order to measure and evaluate the outcome (Simons 1995). The companies and industries in this study are communicating environmental strategies in their sustainability reports. There is however an identified gap between the communicated strategies and the reported performance indicators and therefore a gap is also identified for the implementation of the environmental strategies in the management control system. This raise questions regarding what the target is for the communicated strategies

and why there is not a clear link between what is being communicated as strategies and what is being reported as indicators. Previous research has showed that a drive for real change in the sustainability area requires a correlation between the disclosure of the sustainability report, provided performance measurements and actual performance against defined targets in the strategy (Ahern 2016). The sustainability reports in this study raise question marks if this correlation exists in the studied companies. The identified gap in the management control system is based on external observations in this study. There is internal information about the management control systems which are not included in the sustainability reports and can therefore not be assessed. However, because external stakeholders do not have insight into internal processes and activities, it is up to the company to provide information in a credible and reliable way (Hertzig & Schaltegger 2006). In this way, they give the company's stakeholders an opportunity to assess the real impact the company has in the area of sustainability (Maas, Schaltegger & Crutzen 2016).

Previous studies on companies in Sweden have looked at what role sustainability reporting plays for the actual sustainability work inside the companies. Gaps were identified between the content of the reporting and the actual sustainability work taking place (Frostenson, Helin & Sandström, 2013, Borglund, Frostenson, & Windell 2010). This study, which is based solely on sustainability reporting, is in line with previous research from the perspective that it identifies a discrepancy in the implementation of the environmental strategies in the internal management and control system. Ingdahl Carlsson and Pålsson (2015) argues that sustainability reporting seems to have developed faster than the actual sustainability work. The results in this study is leaning towards the same conclusion.

The findings of how *accounting postulates* and *equity theories* are used in the studied sustainability reports were discussed in section 5.2. The important results are that boundaries in space and time cannot be clarified based on the reporting. This raise questions regarding how the environmental strategies are implemented in the company management and control system. The fact that the boundaries in space and time is not clarified raise questions regarding to what extent the management and control system takes into account the broader definition of environmental sustainability. From an external perspective it seems that the control system is not fully implemented to measure all areas of environmental sustainability.

From an *institutional context* aspect, the majority of the companies and industries include the areas of environmental impact in their strategies that is in line with the industry regulations on emissions, which is the base for the industry baseline. But, as previously stated, the level of reported performance indicators is limited compared to the baseline. The GRI core framework requires that the minimum information should be provided in order for stakeholders to understand the nature of the organisation and its material topics and it is required to comply with all reporting requirements for at least one topic-specific disclosure. The study shows that the majority of the companies keep a narrow reporting focus and that only one company comply with the requirement that all requirements should be reported for at least one topic-specific disclosure. The GRI framework itself can be seen a one source for the limited reporting. Previous identified negative aspect with the GRI framework is that the standards gives a lot of flexibility for own interpretations and adjustments. GRI is only acting as a guide providing recommendations. There are no requirements that states that all information needs to be included in a standard GRI reporting. And in addition, there are no requirements for motivating why some information is included and some is not (Rimmel & Sabelfeld 2018). These negative aspects are in line with the findings in this study.

In summary, the majority of the theories in the theoretical framework could not be verified when applied to the empirical collected data in the study. The identified gaps raise several questions. It raises questions regarding the level of environmental sustainability in the studied companies, if a correlation exists between the communicated environmental strategies and the actual performance and to what extent the company's management and control systems takes into account the broader definition of environmental sustainability. Since external stakeholders do not have insight into internal processes and activities, it is up to the company to provide information in a credible and reliable way so the environmental impact can be assessed.

5.4 Other findings

The EU directive for Non-Financial Reporting Directive (EU Directive 2014/95/EU) provides a high degree of flexibility for companies what to include in the reporting. And the most commonly used framework, GRI, also provide a high flexibility on what to include in the reporting. In order to reach a common standard in sustainability reporting, and be less dependent on the level of engagement of each company, this study shows a need for adding enforcement mechanisms to the mandatory sustainability reporting. This would be in line with financial accounting research, which has shown that better auditing and accounting enforcement have a positive impact on financial reporting (Brown, Preiato & Tarca 2014). A willingness to learn from the development of accounting regulation in traditional financial accounting, which has moved from almost non-existing regulation 90 years ago to generally accepted and regulated accounting principles (Flesher & Flesher 1986), could assist in the creation of a regulated common standard. A conceptual framework for sustainable accounting and reporting could assist in the creation of a regulated common standard

Each of the companies in the study require a permit to operate, which includes emission limit values. The sustainability reports do not report environmental performance indicators in relation to these emission limits. This information would be of interest to stakeholders to understand if there is a potential risk in the company.

5.5 Conclusions

The aim of this study was to investigate and explain the implementation of environmental strategies in the company's management control system in three industries in Sweden; forest-, paper-, mining-, and steel industry. The empirical findings in the disclosed sustainability reports demonstrates that there is a gap between the communicated environmental strategies and the implementation in the company management control system in each of the three industries. The result of the study raises questions regarding what the target is for the communicated environmental strategies to what extent the strategies are implemented and to what extent the company's management and control systems takes into account the broader definition of environmental sustainability. External stakeholders need to rely on information in sustainability reports to assess the actual environmental impact of the company and if environmental strategies are implemented in the company (Maas, Schaltegger & Crutzen 2016). The conclusion from this study is there is a need for the companies to clarify in their reporting the correlation between the communicated environmental strategies and the actual performance against defined targets in the strategy. In this way stakeholders can use the provided information to assess the company's environmental impact and what actions are taken to deal with the issues.

What also can be concluded from this study is that the companies in the three industries provide performance indicators to a much lower extent than expected and do not comply with the GRI

core framework. It can also be concluded that despite the existing regulation for disclosing non-financial information, the use of a common framework and the reports being limited assured by auditors there is no common standard on reporting for the companies in each of the industries examined. The companies differ in the way they choose which topics are essential for reporting, to what extent they provide indicators and which areas of responsibility they include. The high flexibility in the GRI framework has in previous research been identified as a negative aspect and this limitation is also recognised in this study.

This study shows a need to add a conceptual sustainable framework for accounting and reporting, enforcement mechanisms and regulated common standards to achieve a more transparent and reliable reporting practice. The third way approach of regulation, between voluntarism and hard regulation, which is the base for the EU directive for Non-Financial Reporting Directive (EU Directive 2014/95/EU), might need to be adjusted to include enforcement mechanisms, credible report assurance practices and a regulated common standard in order to achieve a better reporting practice.

5.5 Limitations

This study is limited to a content analyse of sustainability reports. The reliability of the data and the coding schedules are of high importance to achieve reliability in the research. The content units in the coding schemes are based on the GRI categories and the created industry baselines for the environmental impact are based on the BREF documents and guidelines from SGU. This increases the reliability of the research. The qualitative content analyse is however a limited method. To increase the reliability of the findings it would be beneficial to use a cross reference to another source of data. This study would have benefited from making interviews with people responsible for sustainability reporting within each company to build a deeper understanding of the findings and the reasoning behind the choices the companies has made.

The selection of companies in the study were based on a number of criteria's in order to increase the comparability between the companies and industries. If the same study would be performed on companies operating in other markets or within other legislations the result could be different. On the other hand, since the major findings in the study applies to all the selected industries, it can be assumed that if same selection criteria would be used but applied to other industries the findings would be similar.

5.6 Future research

This study has investigated the environmental dimension of sustainability reporting. It would be of interest to perform the same study looking at the social dimensions of sustainability. It would be interesting to investigate if the same conclusions can be drawn when investigating the implementation of social strategies in the company management and control system.

This study uses a content analyses as research method. To develop the understanding of the research findings and broaden the empirical base future research could expand the insights by interviewing responsible people in the selected companies. It would be of interest to understand the role of the management and control system when preparing the sustainability reports, how the company assess the level of materiality for reporting and how they interpret the GRI guidelines. It would also be beneficial to get an understanding from auditors how they interpret the findings in this study, especially in relation to the unclarity regarding the reported area of responsibilities and the company's assessment of materiality.

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Appendix 1. Presentation of companies and strategies

Forest and paper industry

In this section the three selected companies in the forest and paper industry and their sustainability strategies are presented.

- **Billerud Korsnäs**

Billerud Korsnäs is a Swedish Forest and Paper industry, created through a merger between Billerud and Korsnäs in 2012. It is listed on NASDAQ Stockholm. Each of the companies has a long history in the forest and paper industry. The turnover in 2019 was 24.4 billion SEK and the company employed 4 500 people (BillerudKorsnäs, 2019). Billerud Korsnäs is operating in three divisions: Board, Paper and Solutions. The forest products supplying production is purchased from forest owners. The board division is operated in 3 mills in Sweden. They produce fluting and liner, packaging board and liquid packaging, bleached and not bleached. The paper production is located in four mills in Sweden. The division Solution produce a new form of biologic biodegradable paper.

The sustainability report 2019 is incorporated as a part of the Annual Accounts for Billerud Korsnäs. Environment strategies is reported as a part of one the two of the overall corporate strategies, driving performance, where lower climate footprint is mentioned as one of the areas. Climate footprint is here referred to as fossil fuels. The other strategy is Accelerate the speed of innovation, which included investments in sustainability.

Specific environmental strategies mentioned are:

- Combatting climate change - Minimising the fossil carbon dioxide emissions that arise along the value chain
- Material for the future - improvements of packaging recyclability and a continued development of sustainable alternatives to fossil packaging material.
- Sustainable innovation

Based on Billerud Korsnäs environmental strategies the GRI indicators expected to be reported is GRI 301 Materials, GRI 305 Emissions and GRI 305 Effluents and waste

- **SCA**

SCA is a Swedish forest and paper company, listed on NASDAQ Stockholm. It is currently Europe's largest private forest owner. The turnover in 2019 was 19.6 billion SEK and the company employed 4 253 people. The company SCA is divided into five business units: Forest, Wood, Pulp, Paper, Renewable Energy and the supporting unit Sourcing & Logistics. The forestry operations supply SCAs industries and sawmills with wood. SCA operates five sawmills in Sweden and in UK. The three papermills are located in Sweden and produce kraftliner (transport packaging) and publication paper. SCA produce bleached softwood kraft pulp and chemical thermomechanical pulp in a mill in Sweden. The company is also one of Europe's largest producer of forest-based bioenergy and produce pellets in three factories in Sweden (SCA, 2019).

The sustainability report is presented as a part of the Annual Accounts 2019 for SCA. Two of the seven overall corporate strategies regard environmental strategies: Optimize nature conservation and develop business opportunities in renewable energy

Specific environmental strategies reported are the following:

- Fossil free world
 - Growing forests bind CO₂
 - Renewable products
 - Fossil-free value chain
 - Renewable energy
- Valuable forests
 - Biodiversity
 - Healthy growth
 - Reliable wood supply
- Efficient use of resources
 - The entire tree is utilized
 - Innovation
 - Continuous improvements
 - Minimize emissions and waste

GRI indicators expected to be reported based on SCAs strategies are GRI 301 Materials, GRI Energy, GRI Biodiversity, GRI 305 Emissions, GRI Effluents and Waste.

- **Holmen**

Holmen is a Swedish forest and paper company, listed on NASDAQ Stockholm. The turnover in 2019 was 16.9 billion SEK and the company employed 2 915 people. Holmen is divided into five business units: Forest, Cardboard, Paper, Wood products and Energy. The cardboard production takes place in Sweden and in UK. The two paper mills are located in Sweden. The wood mill is also located in Sweden. Holmen is also the full owner or share ownership of 21 hydro- electric plants and 2 windmills in Sweden (Holmen, 2019)

Holmen includes the Sustainability report as a part of the Annual Accounts in 2019. In the overall corporate strategies two of the six strategies relates to the environment.

- Climate strategy:
 - Climate benefit will be enhanced as a growing volume of standing timber binds increasing amounts of carbon dioxide, while our products replace fossil-based alternatives and we reduce the fossil emissions in our value chain.
 - Furthermore, expanding wind power will contribute to the transition to a fossil-free energy system in Europe.
- Renewable energy
 - Renewable energy will grow by complementing the existing production of hydro power with large-scale wind power on our own land.

The specific environmental strategies are as follows:

- Better climate
 - Our growing forests capture and store increasing amounts of carbon dioxide, while also providing us with renewable alternatives to fossil materials
- We help our customers in their sustainable business

- We offer our customers sustainable alternatives to fossil-based materials. The products can also be reused and recycled, increasing their benefit and reducing the burden on the environment

GRI indicators that are expected to be reported based on reported strategies are GRI-301 materials, GRI - 302 Energy and GRI 305 - Emissions. Since renewable energy in the form of owner of hydro- electric plants and wind mills, can potentially impact biodiversity in a negative way (Naturskyddsforeningen, 2020) the GRI-304 Biodiversity is also expected to be reported.

Mining industry

This section presents the two companies in the mining industry and their sustainability strategies.

- **LKAB**

LKAB is a Swedish global mining company, owned by the Swedish Government. The turnover in 2019 was 31.3 billion SEK and the company employed 4 300 people. LKAB operated three mines located in Sweden. The company supplies iron ore products for the global steel market and in addition it produces industry minerals and water powered drilling systems (LKAB 2019).

LKAB has incorporated the Sustainability report in the Annual Accounts 2019 for LKAB. The overall corporate strategy includes sustainability.

- Highly upgraded and climate efficient iron ore products
- New technology for profitable and sustaining mining and processing
- Business development with focus on a focus on recycling and new products

The specific sustainability strategies reported for LKAB regarding the environmental area are the following:

- LKAB aims to be one of the most resource-efficient and environmentally efficient mining companies in the world.
- Our long-term ambition is to achieve carbon-neutral operations.
- Our ambition also includes environmentally neutral use of water and energy, and no impact from emissions on our surroundings.
- We safeguard biodiversity and are working to turn by-products into resources

Based on LKABs sustainability strategies the GRI indicators expected to be reported are the same as identified for the industry and in addition GRI- 308 Supplier Environmental Assessment.

- **Boliden**

Boliden is a Swedish global metal producing company, listed on NASDAQ Stockholm. The turnover in 2019 was 7 billion SEK and 3 442 people were employed in the company. Boliden's has six mines located in Sweden, Finland and Ireland, and six smelters, are located in Sweden, Finland and Norway. The company produces basic metals (zinc, copper, lead, nickel), precious metals (gold, silver) and concentrate sulphuric acids. Boliden is one of the largest mining and smelters company in the world in the area of zinc production. Boliden is as well a market leader in electronic material recycling and is of Europe's biggest recyclers of used lead-acid batteries (Boliden, 2019).

The sustainability reporting is included as a part of the Annual Accounts in 2019 for Boliden. Sustainability is included in one of three overall corporate strategies when it comes to constant improvements; “Improved stability and high productivity in existing facilities reduce costs, increase production, reduce the risk of accidents, and minimize environmental impact, all without the need for major investments.”. It is also mentioned in the report that “Sustainability is part of the company’s strategy and business planning.”

The specific environmental strategies mentioned are the following:

- Boliden contributes to societal development and adaptation to climate change by extracting, producing and recycling metals while taking clear environmental responsibility
- Boliden’s business development focuses on innovation and continuous improvements in areas such as automation, digitalization and electrification.

By incorporating in the overall strategy minimizing of environmental impact there is an expectation that Boliden is including all the identified GRI indicators for the industry in the reporting and in addition GRI- 308 Supplier Environmental Assessment.

Steel industry

In this section the three companies in the steel industry and their sustainability strategies are presented.

- **Sandvik**

Sandvik is a Swedish global high technology steel, listed on NASDAQ Stockholm. Turnover 2019 was 103 billion SEK and the company had 40 235 people. The production sites are located globally with the main sites in Sweden and US. Sandvik is producing tools and tooling systems for industrial metal cutting, equipment and tools, service and technical solutions for the mining and construction industries and advanced stainless steels and special alloys as well as products for industrial heating (Sandvik, 2019).

Sandvik produces a combined annual account and sustainability report. The overall strategy for Sandvik in the report for 2019 is not specific mentioning sustainability strategy but it is mentioned that “Sustainability is an integral part of our strategy and business model. We take a holistic view on sustainability, including suppliers, customers and our own operations in targets and plans.”.

The specific sustainability strategies reported for Sandvik regarding the environmental area are:

- We build circularity
 - We will drive the shift to more circular business models and use of resources, finding ways to close loops and generate new revenue streams from the processes and materials we use
- We shift climate
 - We will deliver on our commitments to reduce our climate impact. We are aiming to shift mindsets and outcomes in our own business, for our customers and with our suppliers to help reach our targets.

In the second strategy only the reduction of CO₂ is mentioned as a target. Based on Sandvik’s sustainable strategies the expected GRI indicators to be reported is GRI- 301 Materials, GRI- 305 Emissions, GRI - 306 Effluents and waste and GRI- 308 Supplier Environmental Assessment.

- **SSAB**

SSAB is a global Swedish steel company, listed on NASDAQ Stockholm. The turnover in 2019 was 76 billion SEK and the company employed 14 500 people. SSAB is a leading producer of Advanced High-Strength Steels (AHSS) and Quenched & Tempered Steels (Q&T), strip, plate and tube products, as well as construction solutions. The main production sites are located in Sweden (three sites), Finland (two sites) and North America (two sites). The production sites in Sweden is based on iron ore and coal and in North America it is based on steel scrap (SSAB, 2019).

SSAB produces a combined annual account and sustainability report. The overall strategy for SSAB in the report for 2019 is including the sustainability strategy. The overall strategy for SSAB is "... to strengthen our leading positions in high strength steels globally, in our home markets, and as a provider of value-added services. ". Incorporated in the lead concept is to be leading in sustainability performance and to become the first fossil-free steel company in the world.

The specific sustainability strategies for SSAB regarding the environmental area are:

- Sustainable operations
 - SSAB is committed to minimizing any adverse environmental impacts from operations.
 - SSAB focuses on continuous improvement to minimize emissions and improve productivity, as well as material and energy efficiency.
 - SSAB is working toward a fossil free steelmaking process through the HYBRIT initiative and by eliminating other fossil related emissions
- Sustainable offering.
 - By using SSAB's high strength steels, which results in lower weight and improved fuel economy, customers can achieve significant CO2 savings during their end products' use-phase.

Based on SSABs sustainable strategies the expected GRI indicators to be reported is the same as for the industry. SSABs strategy is to minimize any adverse environmental impact and thus complies with the indicators mentioned for the industry.

- **Höganäs**

Höganäs is Swedish company founded in 1797. It is a non-listed company. The turnover in 2019 was 10.3 billion SEK and the company employed 2 500 people. Höganäs is one of the leading global providers of iron and metal powders. The company has 18 production facilities located in 11 countries (Höganäs, 2019). Höganäs has published its sustainability report in a separate report for 2019. However, the Annual Account is not published until June 2019. The sustainability report is not assured.

The sustainability strategies for Höganäs regarding the environmental area are:

- Reducing emissions by increasing energy efficiency
- Using more recycled materials to decrease upstream emissions
- Increasing the use of renewable energy and fuels

Based on Höganäs sustainable strategies in the environmental areas the expected GRI indicators to be reported is GRI 301 Materials, GRI 302 Energy and GRI 305 – Emi

Appendix 2. Empirical findings per company

Forest and Paper industry, coding Scheme 1

Billerud Korsnäs	Expected reported GRI indicator for the Forest and Paper industry	Baseline	Expected reported GRI indicator - Corporate strategy	Reported GRI indicator	Actual reported indicators
GRI 301	Materials	3	3	1	1
GRI 302	Energy	5	0	1	2
GRI 303	Water and effluents	3	0	1	0,5
GRI 304	Biodiversity	4	0	0	0
GRI 305	Emissions	7	7	1	3,5
GRI 306	Effluents and waste	5	5	1	1
Total		27	15	5	8

SCA	Expected reported GRI indicator Forest and Paper industry	Baseline	Expected reported GRI indicator - Corporate strategy	Reported GRI indicator	Actual reported indicators
GRI 301	Materials	3	3	0	0
GRI 302	Energy	5	5	1	0,5
GRI 303	Water and effluents	3	0	0	0
GRI 304	Biodiversity	4	4	0	0
GRI 305	Emissions	7	7	1	2
GRI 306	Effluents and waste	5	5	1	0,5
Total		27	24	3	3

Holmen	Expected reported GRI indicator Forest and Paper industry	Baseline	Expected reported GRI indicator - Corporate strategy	Reported GRI indicator	Actual reported indicators
GRI 301	Materials	3	3	1	0,5
GRI 302	Energy	5	5	1	0,5
GRI 303	Water and effluents	3	0	0	0
GRI 304	Biodiversity	4	0	0	0
GRI 305	Emissions	7	7	1	2,5
GRI 306	Effluents and waste	5	0	1	1
Total		27	15	4	4,5

Mining industry, coding Scheme 1

Boliden	Expected reported GRI indicator Mining industry	Baseline	Expected reported GRI indicator - Corporate strategy	Reported GRI indicator	Actual reported indicators
GRI 301	Materials	3	3	1	2
GRI 302	Energy	5	5	1	2
GRI 303	Water and effluents	3	3	1	2
GRI 304	Biodiversity	4	4	1	3,5
GRI 305	Emissions	7	7	1	2,5
GRI 306	Effluents and waste	5	5	1	2,5
MM1	Biodiversity	1	1	1	1
MM2	Biodiversity	1	1	0	0
MM3	Effluents and waste	1	1	1	1
Total		30	30	8	16,5

LKAB	Expected reported GRI indicator Mining industry	Baseline	Expected reported GRI indicator - Corporate strategy	Reported GRI indicator	Actual reported indicators
GRI 301	Materials	3	3	1	0,5
GRI 302	Energy	5	5	1	1
GRI 303	Water and effluents	3	3	0	0
GRI 304	Biodiversity	4	4	0	0
GRI 305	Emissions	7	7	1	2,5
GRI 306	Effluents and waste	5	5	1	1
MM1	Biodiversity	1	1	0	0
MM2	Biodiversity	1	1	0	0
MM3	Effluents and waste	1	1	0	0,5
Total		30	30	4	5,5

Steel industry, coding Scheme 1

Sandvik	Expected reported GRI indicator Steel industry	Baseline	Expected reported GRI indicator - Corporate strategy	Reported GRI indicator	Actual reported indicators
GRI 301	Materials	3	3	0	0
GRI 302	Energy	5	-	1	1,5
GRI 303	Water and effluents	3	3	1	1,5
GRI 304	Biodiversity	4	-	0	0
GRI 305	Emissions	7	7	1	3
GRI 306	Effluents and waste	5	5	1	0,5
Total		27	18	4	6,5

SSAB	Expected reported GRI indicator Steel industry	Baseline	Expected reported GRI indicator - Corporate strategy	Reported GRI indicator	Actual reported indicators
GRI 301	Materials	3	3	1	1
GRI 302	Energy	5	5	1	1,5
GRI 303	Water and effluents	3	3	1	1
GRI 304	Biodiversity	4	0	0	0
GRI 305	Emissions	7	7	1	5
GRI 306	Effluents and waste	5	5	1	0,5
Total		27	23	5	9

Höganäs	Expected reported GRI indicator Steel industry	Baseline	Expected reported GRI indicator - Corporate strategy	Reported GRI indicator	Actual reported indicators
GRI 301	Materials	3	3	1	0,5
GRI 302	Energy	5	5	1	0,5
GRI 303	Water and effluents	3	0	1	2
GRI 304	Biodiversity	4	0	0	0
GRI 305	Emissions	7	7	1	2
GRI 306	Effluents and waste	5	0	0	0,5
Total		27	15	4	5,5

Forest and paper industry, coding scheme 2

Billerud Korsnäs		
Going Concern Environment	Are environmental investments reported?	Yes, several projects are reported in the area of reducing energy consumption.
	If yes, are related costs and depreciation of the investment reported?	20 M SEK is marked yearly for investment in reduction of energy. The investment project regrading paper bottled has led to acquisition of a new company that will only focus on this project.
Accounting unit	Are all group companies included in the sustainability report?	All companies where BillerudKorsnäs has operational control, which means the companies where the company owns the majority of the shares.
	GRI- 308 - 1 New suppliers that were screened using environmental criteria.	No
	GRI- 308 2 Negative environmental impacts in the supply chain and actions taken	Yes
	GRI - 302-2 Energy consumption outside of the organization	No (do not have control)
	GRI- 305-2 Energy indirect (Scope 2) GHG emissions	Yes
	GRI- 305-3 Energy indirect (Scope 3) GHG emissions	Yes
Accounting period	Does the report mention to what extent the products are recycled?	Several future projects, example recyclable paperbottles, sensors build into packaging that can trace the package throughout the value chain. Increase of Recyclable packaging from today's 70%. Papers fibres produced by the company can be recycled 5-10 times.
	GRI- 301-2 Recycled input materials used	No
Monetary unit	Number of included GRI indicators compared to expected reported indicators	6 GRI indicators reported vs 8 expected for the industry and vs 4 expected based on company strategy
	Are Risks and opportunities taken into account for each reported GRI	No

SCA		
Going Concern Environment	Are environmental investments reported?	Technical investments in Energy savings and efficiency, investments in new machines to increase the recycling grade of paper packaging
	If yes, are related costs and depreciation of the investment reported?	Environmental investment in new paper machine to reduce usage of oil: 1 billion SEK
Accounting unit	Are all group companies included in the sustainability report?	All companies included SCA group including daughter companies where SCA owns more than 50% of the shares
	GRI- 308 - 1 New suppliers that were screened using environmental criteria.	No
	GRI- 308 2 Negative environmental impacts in the supply chain and actions taken	No
	GRI - 302-2 Energy consumption outside of the organization	No (do not have control)
	GRI- 305-2 Energy indirect (Scope 2) GHG emissions	Yes
	GRI- 305-3 Energy indirect (Scope 3) GHG emissions	Yes
Accounting period	Does the report mention to what extent the products are recycled?	Forest and paper products are recycle products but it is not mentioned how the grade of recyclable products usage in own production. Resusage of waste from own production is measured.
	GRI- 301-2 Recycled input materials used	No
Monetary unit	Number of included GRI indicators compared to expected reported indicators	3 GRI indicators reported vs 8 expected for the industry and vs 5 expected based on company strategy
	Are Risks and opportunities taken into account for each	No

Holmen		
Going Concern Environment	Are environmental investments reported?	Investment in windmills, energy saving systems,
	If yes, are related costs and depreciation of the investment reported?	The environmental investment for energy savings, cleaning and building of windmills are specified.
Accounting unit	Are all group companies included in the sustainability report?	All companies in the group.
	GRI- 308 - 1 New suppliers that were screened using environmental criteria.	Yes
	GRI- 308 2 Negative environmental impacts in the supply chain and actions taken	No
	GRI - 302-2 Energy consumption outside of the organization	No (do not have control)
	GRI- 305-2 Energy indirect (Scope 2) GHG emissions	Yes
	GRI- 305-3 Energy indirect (Scope 3) GHG emissions	Yes
Accounting period	Does the report mention to what extent the products are recycled?	The products can be recycled and reused. The life cycle time for the products are not mentioned or how much is reused in own or other productions. Reusage of waste from own production is measured. They partly own the company in Sweden responsible for paper and packaging recycling but no numbers are mentioned.
	Is GRI- 301-2 reported	No
Monetary unit	Number of included GRI indicators compared to expected reported indicators	6 GRI indicators reported vs 8 expected for the industry and vs 4 expected based on company strategy
	Are Risks and opportunities taken into account for each	No

Mining industry, coding scheme 2

Boliden		
Going Concern Environment	Are environmental investments reported?	Investments in water cleaning in smelting sites, in windmills, electifying of mine transports, projects to reduce GHG emissions
	If yes, are related costs and depreciation of the investment reported?	Investments to electifying mine transports is mentioned (300 MSEK), investments in recycling of electronic waste (800 M SEK)
Accounting unit	Are all group companies included in the sustainability report?	Environmental performance data are limited to Boliden's eleven operational business units (as they represent Boliden's significant environmental impact)
	GRI- 308 - 1 New suppliers that were screened using environmental criteria.	No
	GRI- 308 2 Negative environmental impacts in the supply chain and actions taken	No
	GRI - 302-2 Energy consumption outside of the organization	No
	GRI- 305-2 Energy indirect (Scope 2) GHG emissions	Yes
	GRI- 305-3 Energy indirect (Scope 3) GHG emissions	No
Accounting period	Does the report mention to what extent the products are recycled?	Recycling plants in leads from batteries, recycling of zink and copper. 20% of produced copper is recycled.
	GRI- 301-2 Recycled input materials used	Yes
Monetary unit	Number of included GRI indicators compared to expected reported indicators	9 GRI indicators reported vs 11 expected for the industry and vs 11 expected based on company strategy
	Are Risks and opportunities taken into account for each reported GRI indicator?	No

LKAB		
Going Concern Environment	Are environmental investments reported?	Investments to reach a fossil free steel production together with SSAB - Hybrit. R&D to develop CO2 free digitilized and autonomi mining in partnership with other companues
	If yes, are related costs and deprecation of the investment reported?	No
Accounting unit	Are all group companies included in the sustainability report?	All companies in the group.
	GRI- 308 - 1 New suppliers that were screened using environmental criteria.	No
	GRI- 308 2 Negative environmental impacts in the supply chain and actions taken	Yes
	GRI - 302-2 Energy consumption outside of the organization	No
	GRI- 305-2 Energy indirect (Scope 2) GHG emissions	Yes
	GRI- 305-3 Energy indirect (Scope 3) GHG emissions	No
Accounting period	Does the report mention to what extent the products are recycled?	Not reported
	GRI- 301-2 Recycled input materials used	No
Monetary unit	Number of included GRI indicators compared to expected reported indicators	6 GRI indicators reported vs 11 expected for the industry and vs 11 expected based on company strategy
	Are Risks and opportunities taken into account for each reported GRI indicator?	No

Steel industry, coding scheme 2

Sandvik		
Going Concern Environment	Are environmental investments reported?	Innovation in products to help customers to reduce their climate impact.
	If yes, are related costs and deprecation of the investment reported?	No
Accounting unit	Are all group companies included in the sustainability report?	All companies in the group
	GRI- 308 - 1 New suppliers that were screened using environmental criteria.	No
	GRI- 308 2 Negative environmental impacts in the supply chain and actions taken	No
	GRI - 302-2 Energy consumption outside of the organization	No
	GRI- 305-2 Energy indirect (Scope 2) GHG emissions	Yes
	GRI- 305-3 Energy indirect (Scope 3) GHG emissions	Yes
Accounting period	Does the report mention to what extent the products are recycled?	Cooperation with customers and suppliers to minimize waste, influence customers to reduce use less rawmaterials, buy buck used products and use resue them. Goal: 90% recyclable products. Not yet measured.
	GRI- 301-2 Recycled input materials used	Yes
Monetary unit	Number of included GRI indicators compared to expected reported indicators	5 GRI indicators reported vs 8 expected for the industry and vs 4 expected based on company strategy
	Are Risks and opportunities taken into account for each reported GRI indicator?	No

SSAB		
Going Concern	Are environmental investments reported?	Investments to reach a fossil free steel production
	If yes, are related costs and depreciation of the investment reported?	Yes, for the HYBRIT project, 2 billion SEK.
Accounting unit	Are all group companies included in the sustainability report?	All companies in the group
	GRI- 308 - 1 New suppliers that were screened using environmental criteria.	No
	GRI- 308 2 Negative environmental impacts in the supply chain and actions taken	Yes
	GRI - 302-2 Energy consumption outside of the organization	No
	GRI- 305-2 Energy indirect (Scope 2) GHG emissions	Yes
	GRI- 305-3 Energy indirect (Scope 3) GHG emissions	No
Accounting period	Does the report mention to what extent the products are recycled?	Customer included in the R&D phase to understand the life cycle in order for customer to produce long lasting products. Steel keep its characteristics no matter how many time it is recycled. The residues from own production is reused in own or is sold. Total volume is measured per year.
	GRI- 301-2 Recycled input materials used	No
Monetary unit	Number of included GRI indicators compared to expected reported indicators	5 GRI indicators reported vs 8 expected for the industry and vs 8 expected based on company strategy
	Are Risks and opportunities taken into account for each reported GRI indicator?	No

Höganäs		
Going Concern Environment	Are environmental investments reported?	Number of investment mentioned future and actual in energy savings
	If yes, are related costs and depreciation of the investment reported?	Annual Accounts not yet published and no information in the sustainability report
Accounting unit	Are all group companies included in the sustainability report?	The list of entities included in the consolidated financial statements is found in the Höganäs Holding AB's Annual Report 2019. BUT the Annual report 2019 not yet published!
	GRI- 308 - 1 New suppliers that were screened using environmental criteria.	No
	GRI- 308 2 Negative environmental impacts in the supply chain and actions taken	No
	GRI - 302-2 Energy consumption outside of the organization	No
	GRI- 305-2 Energy indirect (Scope 2) GHG emissions	No
	GRI- 305-3 Energy indirect (Scope 3) GHG emissions	No
Accounting period	Does the report mention to what extent the products are recycled?	No
	GRI- 301-2 Recycled input materials used	No
Monetary unit	Number of included GRI indicators compared to expected reported indicators	4 GRI indicators reported vs 8 expected for the industry and vs 3 expected based on company strategy
	Are Risks and opportunities taken into account for each reported GRI indicator?	No