UNIVERSITY OF GOTHENBURG
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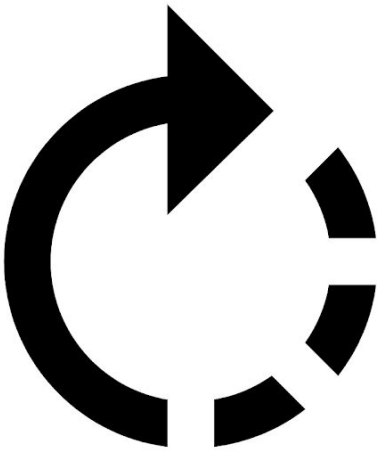
Circular economy and accounting information

A study of the reporting of circular economy in Sweden

Bachelor thesis, Accounting, 15hp
2019-06-01



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ABSTRACT

Titel: Circular economy and accounting information: *A study of the reporting of circular economy in Sweden*

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Background and problem: Facing today's climate crisis, companies play a key role in contributing to a sustainable change. Alternative business models have gained importance, such as circular economy, which refers to the concept of cyclical closed-loop systems. Both governments and external stakeholders are now stressing the importance of circular economy, resulting in new regulations and initiatives. Accounting information, including sustainability reporting, is an important tool for companies to communicate their sustainable actions. Thus, it is of essence for both companies and external stakeholders to gain insight into where the development of reporting sustainability is heading. Correspondingly, to what extent it is influenced by circular economy.

Purpose: The purpose of this paper is to examine the development of reporting circular economy in Sweden. Specifically, to investigate the development during the last five years in which the implementation of the European Union directive and Action Plan have taken place.

Method and theory: The CONI method was used in the study to extract information from accounting information, combining both a quantitative and qualitative approach. Through CONI, both disclosure quality and word frequency have been measured and evaluated. The theoretical framework consists of institutional-, stakeholder-, and legitimacy theory.

Findings: There has been an increase in disclosure quality and quantity regarding the reporting of circular economy over the time period studied. The cause of this increase cannot be explained using a single variable, nor by the empirical results. Hence, its correlation with the new European Union directive or Action Plan cannot be determined. Conversely its contribution can neither be discarded. It is more likely to be the result of many contributing factors. While the terminology of circular economy becomes more frequent and recognized in society, institutional pressure might motivate companies to implement more circular economy in their reports. Furthermore, indications of industry specific characteristics influencing the reporting could be found in the sample. In addition, some specific circular economy activities could be considered more common to report by companies in all industries in the sample. Equally important, the industry that emitted the most greenhouse gases also showed the highest disclosure quality and quantity. A possible correlation could be suspected but not concluded.

Keywords: Circular economy, circular economy activities, accounting information, CONI method.

ACKNOWLEDGMENTS

Firstly, we would like to acknowledge our supervisor Peter Beusch for his guidance and commitment. His valuable feedback contributed throughout the entire writing process. Secondly, we would like to acknowledge the seminar group and the opponents for providing constructive feedback and a positive atmosphere during all meetings. Lastly, we would like to acknowledge each other for our hard work and professional collaboration.

Gothenburg, 2018-05-23

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Gothenburg, 2018-05-23

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1. INTRODUCTION

The following introduction provides a background regarding sustainability and circular economy in a business context. Additionally, an explanation of how it relates to accounting information is provided. This results in identifying a need for further research in the field. Lastly, research questions and the purpose of the study are be presented.

1.1 Background

One of the most heated and heavily debated topics of our time is climate change. Without radical change in human behaviour and company practice, the future adoption of environmental threats will be more difficult and costly (United Nations, 2019). Companies play a key role in contributing to a sustainable change by practicing more responsible business. Consequently, a lot of companies have realised that using traditional linear systems, so called "take make dispose" systems are becoming outdated. Additionally, using linear systems increase their risk regarding potentially higher resource prices and supply distributions. Business leaders are seeking a better industrial model and one solution, circular economy, has gained importance. (Ellen MacArthur Foundation, 2013)

The origin of the concept "circular economy" has had a wide spread of interpretations and associations among different authors over the years. However, commonly they all refer to the concept of cyclical closed-loop systems (Murray, Skene & Hayes, 2017). Much of the research about circular economy has been performed in China, who is a leading country and early adopter (Business Sweden, 2017).

Many external stakeholders are stressing the importance of circular economy; the Ellen MacArthur Foundation is a prominent example. Not to mention, the European Union launched an action plan in 2015 regarding the implementation of circular economy. They conducted a package with legislative proposals on waste, including targets to reduce landfilling and also increase reuse and recycling. The aim is to support more circular economy activities among companies within the European Union. (European Commission, 2017)

Although the importance of the concept is growing, circular economy appears to be in an early stage of development. Even if it provides a reliable framework for improving existing business models towards more sustainable solutions, actions towards a circular economy have only been taken by a limited number of countries. One indication that supports this suggestion is that the implementation of circular economy is primarily focusing on recycle rather than reuse (Ghisellini, Cialani & Ulgiati, 2016). However, while circular economy is considered to be at an early stage by some researchers, Katz-Gerro & López Sintas (2018)

reported that 73% of the small and medium enterprises (SME) within the European Union performed some activities related to circular economy. Hence, it is actually a part of many companies' operations today in Europe, even though all are not familiar with the terminology.

One way for companies to display their sustainability actions, such as adopting circular economy activities, are through accounting information. There has been an increase in the number of organizations that issue sustainability reports, which according to Junior, Best, & Cotter, (2013) can be related to the increasing awareness in society. In addition, the European Union implemented a new directive for member states in 2014, setting a requirement for large companies to publish sustainability reports (European Union, n.d.).

Accordingly, researchers such as Wang, Che, Fan and Gu, (2014) have noticed that with an increase in the implementation of circular economy follows an increase in the reporting of circular economy among companies. However, to what extent the reporting occurs differs between industries as well as the quality of the information reported. This research was performed on companies in China, but they argue that the development of circular economy is in a mature stage in several countries. (Wang et al., 2014)

1.2 Problem discussion

As aforementioned, two main developments can be observed. Firstly, there is an increasing number of organisations reporting their environmental impacts. Secondly, there is an increase in circular economy activities mainly in China and Europe. Specifically, in Sweden many business are working hard towards a circular shift (Business Sweden, n.d.) Considering that this concept has grown in popularity and become more recognized, there is a need for further research on how the reporting of it has developed. That is in Europe and specifically in Sweden where the popularity of the concept is increasing and where research has not yet been performed to the same extent as in China (Business Sweden, n.d.).

Additionally, the recent European Union Action Plan for circular economy and the new directive for sustainability reporting, supports the need for studying this development in Europe. It is of relevance to investigate how the reporting of circular economy activities have developed during the years of these two significant events.

Studying this development would not only be interesting from a stakeholder perspective but from an owner perspective as well. Regarding stakeholders, institutional pressure is a variable affecting sustainability reporting. Various external pressures are key drivers for extensiveness in sustainability reporting. Among them are different groups of stakeholders (Fernandez-Feijoo, Romero & Ruiz 2013). Hence, awareness among stakeholders regarding circular economy may increase their pressure on companies to include the concept in their

accounting information. Further, regarding stakeholders, this impact is important to recognize to support the development of circular economy.

The same interest applies for owners. Since companies within an industry puts pressure on each other by increasing their transparency through sustainability reporting, it is of essence to be aware of where the trend is heading. If the expectations of reporting circular economy are rising in Europe as well, companies need to be aware of this and include it before they fall behind.

1.3 Research questions

Based on above discussion, there is a need for further research within the field. To contribute with valuable information, two research questions have been designed.

1. How has the reporting of circular economy developed as the popularity of the concept has increased?
    1.1 Can any trends or patterns be observed within and between different industries?
    1.2 Can any trends or patterns be observed over time?

2. If an increase in the reporting of circular economy can be identified, can a connection be observed between this development and the new European Union directive and/or Action Plan?

1.4 Purpose

The purpose of this paper is to examine the development of reporting circular economy in Sweden. Specifically, we aim to investigate the development during the last five years in which the implementation of the European Union directive and Action Plan have taken place.

2. LITERATURE REVIEW

In this chapter, important concepts such as "circular economy" and different initiatives are discussed. Further, several theories are presented, including how they relate to the study. Lastly, a discussion regarding sustainability reporting and the reporting of circular economy activities are provided.

2.1 Circular economy

While sustainability is becoming increasingly important in society, circular economy can become a driver for a more sustainable development. Mainly by advocating new, innovative business models that embraces a circulatory thinking. (Manninen, Koskela, Bocken, Dahlbo & Aminoff, 2018). Circular economy aims to obtain an increased harmony and balance between three aspects: society, environment and economy (Ghisellini et al., 2016). While the societal and environmental benefits of circular economy might be easier to comprehend, the economic benefit might be more difficult to distinguish. Although this may be true, the Ellen MacArthur Foundation (2014) reports that there is a global business opportunity of over one trillion US. dollar in material savings by transitioning towards a circular economy business model. The identification of such business opportunities resulted in an increased awareness regarding circular economy business models among companies, hoping to profit on the business opportunity (Planning, 2018).

Additionally, three different changes in society have been used to explain why recently, the popularity of the concept has grown. Firstly, the need to protect scarce resources among the manufacturing industries are increasing due to more volatile price levels. By adopting circular economy business models, the need for resources minimizes due to the usage of closed loop systems. Secondly, new technology has facilitated new business models and created opportunities that were previously not possible. Thirdly, a change in consumer preferences regarding ownership is occurring, resulting in changed consumer behaviour. (Planning, 2018).

Geissdoerfer, Savaget, Bocken & Hultink (2017), reported that the number of publications on the subject circular economy showed a tenfold growth over the last 10 years. However, the perception of the concept is widely spread, and they recognized a need for a literature review. Through this literature review, where the relationship between circular economy and sustainability was explored, the following definition of circular economy was established:

> "we define the Circular Economy as a regenerative system in which resource input and waste, emission, and energy leakage are minimised by slowing, closing, and narrowing material and energy loops." (Geissdoerfer et al., 2017)

Main characteristics of circular economy were also discussed, concluding that the ultimate goal is to achieve a closed loop system, where all resource inputs and leakages of the system are eliminated. The underlying motivation of the concept is that waste can be reduced and resources can be used more efficiently using a circular system compared to a linear one. (Geissdoerfer et al., 2017)

In China the concept was accepted by the government as a strategy for economic growth and scarcity of resources as early as in 2002. China has been recognized as a leading nation in adopting circular economy (Business Sweden, 2017). One definition of the concept has been conducted by "The Chinese Circular Economy promotion Law". This law is used in China for promoting circular economy and its development. It defines Circular Economy as:

> "a generic term for the reducing, reusing and recycling activities conducted in the process of production, circulation and consumption". (The Standing Committee of the National People's Congress China, 2008)

Although the literature provides many perspectives on the definition of circular economy, what is of particular interest in this study is how the circular economy activities are defined. Since not all companies are familiar with the terminology, it is the activities performed that attest whether circular economy is being adopted within a company. These activities will be discussed in later sections.

2.2 The European Union Action Plan for circular economy

In December 2015, the European Union decided on the implementation of an Action Plan to endorse circular economy among member countries. The Action Plan aims to encourage the implementation of circular economy and closed loop systems throughout the entire value chain of companies, from start to finish. The European Union are planning to undertake several actions to reach its goal. For example, increasing the effectiveness of its ecolabel to support sustainable consumption. (European Commission, 2015)

Further, the European Commission (2015) claims that transitioning towards a circular economy will contribute to enhance the competitiveness of the European Union. Implementing this sustainable approach would assure that businesses would not become victims of volatile prices due to deficiencies of resources. Furthermore, it would contribute to more local jobs and business opportunities while simultaneously contributing to more environmental business practice and enabling recuperation of nature.

In a later published reports by the European commission (2017), they claim that the Action Plan contributed in establishing the terminology of circular economy as well as increasing the awareness within member countries. They also report positive results in the implementation process of circular economy in industry processes and among other actors in the European Union. Further, Katz-Gerro et al., (2018) reported that 73% of the small and medium enterprises in the European Union performed some activity related to circular economy.

To summarise, circular economy is becoming more important and recognised. This has resulted in that researchers, external stakeholders, companies, governments and nations have started to stress the importance of a circular shift. However, while studying circular economy and creating an understanding of its development in society, several theories are important to discuss.

2.3 Theories

2.3.1 Legitimacy theory

Legitimacy theory explores the expectations of society, and whether companies are complying with these expectations. However, failure to comply, can threaten the survival of companies. Legitimacy can change over time and place, thus drawing conclusion about it must be made carefully since it can only be understood within its context. As expectation of legitimacy change, companies too must change. If the legitimacy of a company is questioned, it could struggle to attract customers, employees and capital. (Hoque, 2010)

Deegan (2002) explains that society rejects companies that do not operate in a legit manner and thus, it can explain why companies display voluntary information. For instance, why they issue sustainability information.

During the last decades, legitimacy theory has increasingly been used by researchers within social and environmental accounting. The theory can be applied to corporate strategies, specifically those concerning public disclosure of company information. That is, including sustainability reports or annual reports. Considering that accounting information is strategically designed, the theory becomes applicable while analysing the different content. Thus, it also becomes applicable regarding the reporting of circular economy. (Hoque, 2010)

2.3.2 Stakeholder theory

A company has several stakeholders from whom social pressure occurs. Kessler (2013) defines them as:

> "Groups and individuals who have an interest in the activities and outcomes of an organization and on whom the organization relies to achieve its own objectives".

Stakeholder theory discusses the relationship between stakeholders and the company. Companies that treat their stakeholders well are more likely to create more value. This enabling the companies to grow and perform. Stakeholder theory has influenced business practice around the world, including accounting information of larger companies. One factor behind its popularity is the global sustainability trend. However, even though many companies are incorporating this concept in their practice, there are other companies who consider it to be politically trendy and uses the concept as a way of "window dressing". (Kessler, 2013)

Regarding circular economy, stakeholder perspective becomes applicable. Since a company cannot operate without being influenced by the external environment, there is a consistent need for companies to be aware of external forces that impact business practice. Shifting towards a more sustainable approach in business operations will likely result in a cooperative and harmonious stance from stakeholders. Hence, when it comes to circular economy as a solution in addressing sustainability issues, the stakeholder perspective is of great essence. It can ease and benefit the shift towards a circular economy paradigm. (Gupta, Chen, Hazen, Kaur & Santibañez Gonzalez, 2018)

2.3.3 Institutional theory

According to Yang and Su (2014), referring to Scott (2018) and Yang, Su, & Fam (2012), institutional theory administers an explanation of the behaviour and strategies of organisations, from a non-economic perspective. By vastly influencing the market in many areas, institutions regulate the economic activities of companies. Because it is of essence for companies to acquire legitimacy to increase their performance in the marketplace, they must adapt to their institutional environment. That institutional pressure is a variable affecting sustainability reporting is confirmed by Fernandez-Feijoo et al., (2013), who concluded that various external pressures are the key drivers for extensiveness in sustainability reporting.

Moreover, institutional theory takes expression in the field of circular economy and accounting information. Previous research has found that institutional pressure in particular, regulate the quality of "circular economy accounting information disclosure". This research had further findings regarding Chinese listed companies. The companies had increasingly provided more information of higher quality on circular economy in their accounting information. One contributing factor was "shareholding of institutional investors". The companies that were affected by institutional pressures related to environmental protection, tended to report more information on circular economy and satisfying various stakeholders. (Wang, Che, Fan & Gu, 2014)

2.4 The European directive for sustainability accounting information

As aforementioned, one way for companies to display their sustainability efforts are by issuing sustainability reports (Cotter, 2013). Even though many companies already have

ceased this opportunity, the European Union implemented a new directive regarding sustainability reporting in 2014. A European Union directive specifies a goal or target that each member country should accomplish. However, the implementation process is determined by the member country itself (Europeiska Union, n.d.). The directive from 2014 states that all companies of a certain size and certain company group should perform a sustainability report where notes about the social relations, personnel, environment, respect for the human rights and counteracting against corruption are presented. (Riksdagen, n.d.) The directive aims to provide a definite path towards greater transparency within business as well as accountability on environmental and social matters (Globalreporting, 2018).

In Sweden the directive was implemented in the law in December 2016, consequently companies needed to implement this during the annual accounting period of 2017. Only companies that fulfil the criteria of being "large" must report a sustainability report. See Appendix A for an extract of this law. (SFS 1995:1554)

However, researchers such as Ahern (2016) have criticised the directive regarding its actual ability to achieve harmonised standards for sustainability reporting. Not to mention, making sustainability disclosures accessible to the public does not assure sustainability itself. However, Ahren (2016) further claims that although this may be true, the directive is in fact an important contribution to achieving sustainable norms in society. Moreover, Wang et al., (2014) confirms that mandatory disclosure leads to higher quality of the content being disclosed.

2.5 Greenwashing

Although sustainability reporting is becoming more regulated., the lack of verification of the non-financial information can contribute to credibility issues (Roberts & Koeplin 2017). To respond to external pressure, companies could make themselves appear sustainable even though their claims might be ambiguous or even false (Furlow, 2009). The phenomenon, which is referred to as "greenwashing", is defined by Park (2007) as:

> "A term (combining green and whitewash) that environmentalists use to describe the activity (e.g. by corporate lobby groups) of giving a positive public image to practices that environmentalists consider environmentally unsound."

According to Holliday (1994) companies have limited opportunities to communicate with investors, therefore their annual reports become a useful information tool, as well as marketing tool. Since sustainability reporting can be regarded as a marketing tool for companies, greenwashing becomes applicable regarding accounting information as well. Roberts et al., (2017) describes that in the modern age of sustainability reporting companies´ credibility might become damaged, increasing stakeholders' suspicions of greenwashing in the reports issued on sustainability. (Roberts et al., 2017).

2.6 Circular economy and accounting information

As previously stated, the research on circular economy has had a steep increase during the last ten years (Geissdoerfer et al., 2017). However, regarding how circular economy relates to accounting information, less research could be found. One study made on the quality of disclosure information regarding circular economy was conducted by Wang et al., (2014). Their findings on Chinese listed companies confirm an increase of the reporting of circular economy. The study determined that institutional pressure and ownership governance are two main determinants of the quality of disclosure information regarding circular economy. Further, the study confirmed that listed companies in China had increased the quality of disclosure information about circular economy as a result of mandatory disclosure, assets size and capital structure. Moreover, their study concluded that the larger the company, the higher the quality of disclosure information regarding circular economy. Additionally, companies being exposed to greater external pressure tend to disclose more accounting information about circular economy. The study further concluded that the profitability and/or location of the companies studied had low correlation with the disclosure quality of circular economy. (Wang et al., (2014).

Although this may be true, no complementing research confirming their findings could be found. Further, extracting circular economy disclosures from companies´ accounting information can be challenging. Especially, since all aspects of circular economy would have to be identified in the reports. Therefore, it is of essence to identify all main activities relating to the concept.

2.7 Circular economy activities

The terminology of circular economy is becoming increasingly known, but it is not yet fully established. Hence, it is likely that companies are using more familiar terms to communicate their sustainable activities related to circular economy. These activities need to be established and defined to be used in the study.

Although there are several definitions and categorisations of circular economy activities, the activities included in this study were based on four principles developed by the Ellen MacArthur Foundation (2015), co-funded by the European Union. These four principles were used by the Ellen MacArthur Foundation in order to provide a methodology for measurement of circular economy. Thus, it would also be suitable when choosing what circular economy activities to include in this study. The principles are displayed below:

i) using feedstock from reused or recycled sources
ii) reusing components or recycling materials after the use of the product
iii) keeping products in use longer
iv) making more intensive use of products

(Ellen MacArthur Foundation, 2015)

From these principals, circular economy activities could be established by the authors with supporting literature. From the first principle, reuse and recycle were enacted followed by waste reduction from the second principle. From the third and fourth principle, the activities refurbishing, remanufacturing and extend life cycle were established. The activity "extend life cycle" include two sub activities maintenance and repair.

However, researchers such as Katz-Gerro et al., (2018) and Reichel, De Schoenmakere & Gillabel, (2016) include the usage of renewable resources as being a central part of circular economy. Renewability could not be concluded from the principals as an activity and the Ellen MacArthur Foundation neither include it in its methodology based on the principals. However, the Ellen MacArthur Foundation (2015) provides guidance on how it could be integrated into its methodology. Thus, in this study, usage of renewable resources was added as an activity in order to capture the full scope of circular economy.

The definition of each circular economy activity was conducted from the same report made by the Ellen MacArthur Foundation (2015), except the definition of usage of renewable resources which were conducted from a previous publication by the Ellen MacArthur Foundation (2013). The definitions of all activities can be seen in table 2.1.

Table 2.1 - Definitions of circular economy activities

Circular Economy Activities	**Definition**
Recycling	"*A process of recovering materials for the original purpose or for other purpose. The materials recovered feed back into the process as crude feedstock. Recycling excludes energy recovery.*"
Remanufacture	*"A process of disassembly and recovery at the subassembly or component level. Functioning, reusable parts are taken out of a used product and rebuilt into a new one."*
Refurbishing	*"A process of returning a product to good working condition by replacing or repairing major components that are faulty or close to failure, and making 'cosmetic' changes to update the appearance of a product, such as cleaning, changing fabric, painting or refinishing."*
Reuse	*"The use of a product again for the same purpose in its original form or with little enhancement or change."*
Waste reduction	*"Unrecoverable waste includes waste going to landfill, waste to energy and any other type of process after the use of a product where the materials are no longer recoverable."*
Extend life cycle	*"The lifetime is the total amount of time a product is in use, including potential reuse of the whole product. The lifetime can be increased by repair or maintenance."*
Renewable resources	*"The energy required to fuel this cycle should be renewable by nature, again to decrease resource dependence and increase system resilience (e.g. to oil shocks)."*

(Ellen MacArthur Foundation, 2013/2015)

3. METHOD AND RESEARCH DESIGN

In the method section the sample and selection process are presented. Thenceforth, the CONI method is described, including its three step approach and how it has been adapted to fit the study. Lastly the pilot study is presented, resulting in a coding manual.

3.1 Method selection

The purpose of this paper is to examine the development of the reporting of circular economy and its activities. Hence, the subject of analysis is the accounting information in sustainability- and annual reports. In order to examine the reporting of circular economy and extract relevant information from the reports, a suitable method is a content analysis (Krippendorff, 2004). A content analysis is defined as:

> "a research technique for making replicable and valid inferences from texts (or other meaningful matter) to the contexts of their use" (Krippendorff, 2004)

A content analysis allows a transparent research where the replicability is high and follow up research is facilitated. Further, it is a flexible method that can capture various unstructured information and can enable findings for groups otherwise difficult to access directly (Bell, Bryman, Harley, 2018). In annual reports, the information is unstructured and can vary between companies, making such method suiting.

Beck, Campbell & Shrives (2010) indicate that a content analysis can be classified into two general approaches. These approaches are called mechanistic and interpretative, where the mechanistic approach is a quantitative approach and the interpretative approach is a qualitative approach. The mechanistic approach aims to provide information about the numeric frequency of explicit phrases and words which later are ranked from a specific scheme. The interpretative approach aims to interpret the content and value the quality of this content. In their paper from 2010 they combine the mechanistic and interpretative approaches into a new unified approach referred to as CONI, which stands for consolidated narrative interrogation. Beck et al., (2010) further showed that CONI extracted a considerable amount of information from the reports that would have been inaccessible if one of the approaches would be used alone. Thus, in this study CONI were used as it has potential to capture more of the data that this study wanted to extract.

3.2 Selection of industries and companies

While deciding on the sample of the study, various factors were considered. Mainly country, industry and size. Beck et al., (2010) argue that similar companies, that is for example in the

same industry and in the same markets should ideally have similar reports as they are exposed to the same external pressure. Consequently, in order to make a comparison, at least one factor must differ from the others. Therefore, this study were based on different industries, however in the same country.

The purpose of this paper is to investigate the development of reporting circular economy in Sweden during the last 5 years within different industries. Katz-Gerro et al., (2018) found that companies that were more involved in circular economy activities had a higher probability of being located in early member states of the European Union. Hence, it seemed preferable to investigate one of these countries. The selection of country was ultimately based on the location of the authors, which is Sweden, a relative early European Union member. This resulting in more easily accessible information.

The choice of industries was based on the degree of emission of greenhouse gases. Industries with higher pollution rates also have higher disclosure quality in their sustainability reporting according to Wang et al., (2014). In their study, in accordance to institutional theory, they found that industries with either high environmental sensitivity, consumer proximity, pressure from investors or employees all presented more extensive sustainability reports. One way of measuring environmental impact is by hazardous emissions. Thereby, greenhouse gases emitted per industry in Sweden were analysed. The industries that emitted the most greenhouse gases were selected and are illustrated in Table 3.1. (SCB, 2018)

Table 3.1 The most polluting industries in Sweden

Group	Sector	Percentage of greenhouse gases emitted of the whole business sector
C10-12	Food industry	15,9
C20-C21	Manufacture of chemicals and chemical products pharmaceutical products and pharmaceuticals	5,5
D35	Electricity, gas and heating plants	4,8
H51	Airline	4,7
F41-43	Construction	4,7
C29	Industry for motor vehicles, trailers and semi-trailers	4,1
C19	Industry for coal products and refined petroleum products	4,1
A01	Agriculture and service companies for agriculture	4

Besides narrowing down industries for comparison, companies also needed to be selected. Regarding Swedish regulations, only large companies have the legal requirement to publish sustainability reports (SFS 1995:1554). Thus, a study on large companies would provide more easily collected and detailed data. Another variable used to narrow down the sample, was that the companies needed to be listed. Listed companies generally have a greater need to satisfy the information requested from their stakeholders (Marton, Lundqvist & Pettersson,

2018). Previous research not only suggests that listed companies are more likely to disclose more information in their reporting, but also provides higher disclosure quality regarding circular economy itself (Wang et al., 2014). To conduct a reliable sample, listed companies within the eight most polluting industries, were selected from the Large Cap list on the Swedish stock market NASDAQ Stockholm.

A list of Swedish Large Cap companies was retrieved and filtered by industry category at the website of Aktiespararna (2019). 17 companies from the total list were a part of the most polluting industries and are shown in Table 3.2.

Table 3.2 Large Cap companies from the most polluting industries

C10-12	**C20-21**	**D35**	**H51**	**F41-43**	**C29**	**C19**	**A01**
AAK	Hexpol	Lundin Petrol		JM	Autoliv SDB		
Axfood	Arjo B			Skanska B	Veoneer		
	Astra Zeneca						
Ica-gruppen	Sobi			NCC B	Volvo		
	Vitrolife			Peab B	Saab		

Since no Large Cap companies were found in the industries airlines, agriculture and industry for coal products, these were not investigated further. The same applies for the industry for electricity gas and heating plants, where only one company could be found. Since one company cannot represent one industry alone and make a reliable sample, this industry was excluded as well, resulting in a smaller sample. Consequently, this need to be considered while analysing the results.

Subsequently, four industries and 16 companies were analysed. It is important to note that there were a different number of companies within each industry, this must be taken into consideration while analysing the results. The data was primarily collected from the sustainability reports of the selected companies. If a company had not published a separate sustainability reports, the annual report was used as the subject of analysis. These reports were mainly retrieved from the websites of the companies. If the reports were not accessible, they were ordered from the companies´ sustainability departments.

As aforementioned, the directive for sustainability reporting was introduced by the European Union in 2014 and implemented in the Swedish law from 2016. In addition, it was in 2015 that the European Union launched their Action Plan for circular economy as the popularity of the subject grew. Thus, it is of interest to investigate both the period before and after these changes to capture their potential impact. The first reports published after the new directive for sustainability reporting were in 2017. However, the first reports published after the circular economy action plan were in 2016. Considering these years being of particular interest, this study examined the financial years of 2014 to 2018.

3.3 Developing the method - adoption of the original CONI

CONI provide a measure of information content, diversity and volume. This by categorising the content of the sustainability reports by the subjects it takes into account. The categories will be used to identify and classify relevant content in the reports. The original CONI was divided into 12 categories with 48 subcategories, mainly focusing on sustainability. In this study two categories with nine subcategories were constructed to fit the research question. However, they were based on the same approach as the original CONI. That is, analyse and review relevant literature for common themes and patterns, and to find definitions and content categories. The categories and subcategories for this study were established in the literature review above where definitions of both circular economy and circular economy activities were provided. These two were also selected as the main categories for the study. This would enable detecting all relevant information needed to answer the research questions. (Beck, et al. 2010).

To the category circular economy two subcategories were selected, which would enable capturing any documentation of the concept in the reports. These were "circulatory systems" and "closed loop system", which both are common terms used to describe the adoption of circular economy. To the category circular economy activities, seven main circular economy activities were conducted and defined in the literature review. The categories and subcategories are shown in Table 3.1.

Table 3.3 CONI categories

Main category	**Sub-category**
Circular economy	1. Circulatory system 2. Closed loop system
Circular economy activities	1. Remanufacture 2. Refurbishing 3. Reuse 4. Recycling 5. Waste reduction 6. Extend life cycles a. Maintenance b. Repair 7. Renewable resources

The information that is presented in the reports of the selected companies will be categorized and analysed in three different steps. These steps include both the performance of the

qualitative and quantitative analysis. The process of each step will be described in the following section.

3.3.1 Step 1 - Content diversity

The purpose of Step 1 is to extract all relevant information which can be attributed to the category (Beck et al. 2010). Each of the reports were tested against one subcategory at the time. All relevant information and most common content per theme were categorized. To identify and categorize the content, keywords were identified and used (See Appendix B). Since not all reports could be found in English, a Swedish translation of the keywords were made by the authors. Furthermore, while using the keywords, the need for synonyms were discovered. If a relevant keyword that would contribute to capturing the subcategory could be identified, it was included in the search as a complement.

In order to facilitate the search and sorting of data, the software NVivo 12 were used as a tool throughout the entire CONI process. Nvivo, for instance, provides tools for classifying and categorising data (NVivo", 2019).

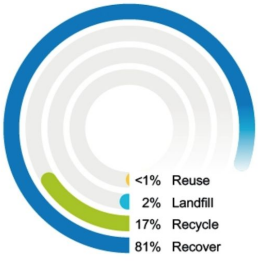
3.3.2 Step 2 - Content quality

After the categorization in step one, the sorted data by subcategories were evaluated based on the quality of the information presented. The sorted data was classified into five disclosure types in accordance with Beck et al., (2010). However, in this study types are referred to as levels, which can be seen in Appendix C. A sixth level was also present, a level only used if the subcategory was not mentioned. The different levels represent how detailed the content was, where level one was the lowest level and five the highest. In short, each subcategory was given one overall score to demonstrate what quality level each subcategory revealed. By doing so, it enabled observing any increases or decreases in scores over the five-year period studied, likewise patterns of quality. One industry was analysed at a time and the scores extracted from the sorted data in Nvivo were summarized in a separate excel sheet. In order to ensure the reliability of the results, both authors performed the scoring of disclosure quality on all of the reports. Afterwards the results were compared and discussed. If any differences in scores occurred, another evaluation was performed by the authors together. In case of disagreements or uncertainties, the lowest number were given.

Level one only provides limited detailed information, such as only a simple mentioning of the subcategory. Despite that, the diversity of level one, that is a lot of different mentions on level one, can provide an indication of the extent of the overall report. A limited number of level one disclosures in a report presumably discusses less issues than a report with more level one disclosures (Beck et al., 2010). Level two provides more information than just a simple mentioning and level three provides numerical information. Numerical information is regarded as more qualitative according to CONI as it is presumed to be more easily comparable and thus more usable to stakeholders. A typical numerical example was reporting

the amount of reused materials in production. Level four provided comments, descriptions and explanations of the numerical information whereas level five additionally provided comparisons such as comparing trends over time or industry averages (Beck et al., 2010). To further clarify how the information was classified to its disclosure level, examples from Axfood and AAK are presented in Table 3.4.

Table 3.4 Examples of quality disclosure types

Disclosure type	**Sub category**	**Example**
1	Closed-loop system	*"Axfood puts great emphasis on recycling in its efforts to contribute to **closed-loop** economies." (Axfood, 2015)*
2	Waste	*"All of Axfood's stores, warehouses and offices sort many fractions. Materials like shrink wrap and corrugated board are sorted and are profitable fractions that are sold. A growing share of food **waste** is sorted for biogas production."* *"Axfood is working in various ways to optimize its use of resources and prevent food **waste**, such as through improved ordering routines and flow control. In addition, solutions are being pursued at the local level through collaboration with non-profit organizations to donate food." (Axfood, 2014)*
3	Recycle	 (AAK, 2017)
4	Waste	*"Food **waste** is hard to avoid for a grocery store. For a discount chain like Willys, it is only natural to take up the battle against unnecessary costs. For this reason Willys has created Svinnsmart ("**Waste**-smart"), which entails taking care of food that would otherwise be thrown out. The goal is to cut the chain's food **waste** in half by 2020. One new initiative in 2017 was to cut the price for day-old, in-store baked bread and to display products nearing*

		*their best-before date for sale at a lower price. Willys continues to look into ways of reducing **waste**. At year-end 2017, 72 stores had partnerships with charitable organizations that accept food donations, including the Salvation Army, Stadsmissionen, Hela Människan and Alsike kloster. Several hundred tonnes of food were donated during the year." (Axfood 2017)*
5	Waste	*"During 2018, AAK's production sites generated 128,000 MT of **waste**. This is an increase of 6.6 percent compared to 2017 and is driven by the inclusion of new sites and larger processed volumes. Of the total amount of **waste** 99.4 percent was non-hazardous."* *"In **waste** disposal, there is a clear, very determined effort toward reducing waste going to landfill. In 2015, AAK set a waste ambition for 2018, targeting that less than 1.5 percent of the **waste** in AAK should be disposed at landfill. Looking at comparable conditions to when the ambition was set AAK reached the objective and 1.5 percent of the **waste** was disposed at landfill in 2018. However, changes in the US legislation regarding the classification and handling of used bleaching earth has meant that 1.5 percentage points extra **waste** had to be sent to landfill. The new baseline including the four new production sites adds 1.8 percentage points of waste to landfill." (AAK, 2018)*

3.3.3 Step 3 - Volumetric measures

Finally, the third and last step was to examine the coded data from a volumetric perspective. This complements the previous qualitative measurements with a mechanistic measure. Analysing the volume in each subcategory gives an indication of the importance of it (Beck et al., 2010). The volumetric count selected as the subject of analysis was the frequency of each subcategory in the report. Hence, a calculation of how many times a keyword for the subcategory appeared in each report was made. The word frequency function in Nvivo was used to calculate the frequency of each keyword. Each industry was analysed at a time and the frequencies were summarized in the same excel sheet used for the data in Step 2.

The volumetric count is supposed to enable observing a potential decrease or increase in reporting frequency over time. As in Step 2, both authors performed the measuring for all

reports and then compared their findings. If differences arose, a new calculation was made by the authors together.

3.4 Pilot study

To ensure the method selection and that the actual empirical data collection would be performed efficiently, a pilot study was first carried out. The pilot study was performed on all 17 companies´ reports from 2018. In this process, both companies and keywords were eliminated from the study.

While analysing Veoneers report from 2018, a discovery was made that Veoneer is incorporated in Delaware, United States. Even though Veoneer is listed on the Swedish stock exchange, they do not follow the European Union directive from 2016. This affects the comparability between the other companies in the industry. Hence, a decision was made to exclude the company from the study.

The same decision was made regarding Arjo who became independent in 2017. Previously they were a part of Getinge who published all reports, affecting the comparability. Since the aim of the study was to see the development over a five-year period, two years of sustainability reports were not enough. Hence, a second company had to be excluded.

While performing the evaluation of each report, using the subcategories “maintenance” and “repair” appeared to result in invalid results. Many companies, especially those whose sustainability reports were included in the financial reports, used these words in many sentences not related to the circular economy activity “extending life cycles”. The decision was therefore made to only search for “extending life cycles” without these additional activities.

Other difficulties appeared in the coding itself resulting in many grey areas for interpretation. Consequently, the pilot study resulted in a coding manual where several guidelines were agreed upon. Each author used this manual while separately analysing the data, ensuring the quality and unanimity in the results.

3.5 Coding manual

The keywords used in Step 1 were adapted so that they would catch the entire frequency regardless of the inflection. For example, the keyword to the subcategory “recycling” were “recyc”, identifying both when the companies wrote about recycle, recycling, recyclable and recycled. This assured that inflection would not affect either the identifying of the category or the frequency count in Step 3. Moreover, if relevant synonyms could be identified to the keywords, these were used as a complement.

While using the disclosures in Step 2, if multiple subcategories are mentioned in the same sentence or paragraph, or several sentences related to the similar content categories, the decision was to code based on theme instead. This preventing for any double counts and unfair high results. Another guideline used in this step, was that when hesitation occurred on what score to give, the lowest of the two would be used. Rather to be restrictive than permissive. Furthermore, while deciding whether a mention is numeric, years and undetermined pronouns were not regarded as numeric disclosures.

Some of the keywords included in the study could still appear in sentences not related to the subcategory. Especially the search of "extend life cycle" and "renewable resources" often resulted in this problem. Also, these were often cases when the sustainability report was included in the annual report. To ease the search and address this issue, the decision was made to only take the content into account if it was a part of the sustainability report. In clarification, while search for "extended" in ICAs annual report, to capture the circular economy activity "extend life cycle", the following quote was identified:

> "Among other things, in consultation with ICA Sweden, growers have invested in growing and storage so as to extend the season for Swedish root vegetables by two months – from eight months to ten." (ICA, 2017)

Clearly, this would be included. However, the following quotes from the same report would have been excluded:

> "The option exists to extend the leases beyond the current term."(ICA 2017)

> "The rate of renewals of the existing store network will remain high and will encompass around 250 stores." (ICA, 2017)

To further assist the analysis, the previously illustrated Table 3.4, which demonstrates the different disclosure levels using reports from AAK and Axfood, were used by both authors as a guide throughout the performance of step 2.

3.6 Validity and reliability

An important factor to consider in a content analysis is the reliability of the study. According to Bell, Bryman & Harley (2018), it is important that the researchers' interpretations of the information do not differ and affects the results. To ensure the reliability of the empirical findings both authors performed the scoring separately on all reports. Later these results were compared and in case of any differences in scores these were further investigated. In case of disagreement or uncertainties, the lowest number were given. If the reports would have been divided by half and only analysed separately, it could have a negative impact on the reliability.

Both external and internal validity have been considered. Regarding external validity, it is vital to determine to what extent the empirical findings can be generalized over the entire population (Bryman & Bell 2013). One way of improving external validity in the study was to include multiple industries with high environmental impact, rather than relying on one single industry. However, generalizations should still be made with careful considerations, the four industries do not represent the entire population to such extent.

Internal validity however is about the accuracy of the study, if the research method is solid and the conclusion has a high degree of warranty (Bryman et al., 2013). The empirical results were consistent with previous research in the field, such as Wang et al., (2014), supporting to some extent the accuracy of the study.

3.7 Method criticism

As implied by Bell et al., (2018), there are several limitations to a content analysis. Firstly, the results will be determined by the quality of the documents analysed. That is if they are authentic, credible and representative. While using company reports this becomes an important aspect to consider. Financial- and sustainability reports are often used by companies to market themselves (Holliday 1994). Hence, they are a bias, non-objective, sources of information. However, since the study aims to investigate the reporting itself and the complexity of how it develops in relation to societal changes, this does not have a negative effect on the results.

Secondly, since the coding manual is conducted by the authors this makes it impossible to avoid some extent of their interpretations (Bell et al., 2018). To reduce the degree of interpretations, the coding manual has been conducted based on previous literature and a scientific approach. Although, since it is impossible to eliminate this aspect, it is important to consider while evaluating the results.

Ultimately, although CONI can give an indication of the quality of the content, asserting that any content analysis method is able of measuring quality should be done carefully. To be able to measure quality, supporting evidence from information users must be assessed Beck et al., (2010) express. However, CONI besides its quantitative approach, can illustrate "the level of information detail" accommodated in the sorted data and thus it can give an indication of the quality (Beck et al., 2010).

4. EMPIRICAL FINDINGS

In this chapter, the empirical findings are presented. Firstly, the qualitative results are presented followed by a comparison of qualitative findings between the different industries. Secondly, the quantitative results are presented in the same manner.

The data was gathered and structured in Nvivo. During this process some initial observations were made. It seemed to be no apparent increase in standalone sustainability reports nor those included in annual reports over time. Furthermore, no apparent pattern in quality and/or quantity were observed that could be linked to how the sustainability report were presented.

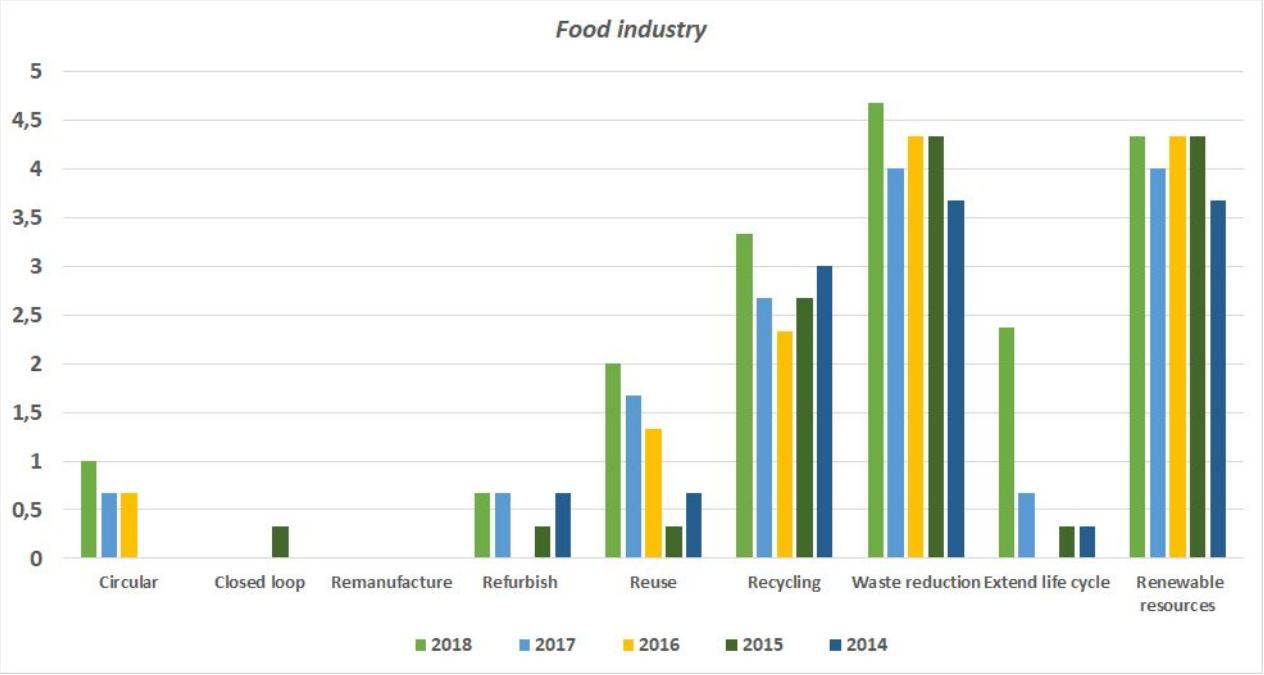
4.1 Qualitative results

In the following tables, the results from Step 2 in CONI are presented. For every company, each subcategory has been given a score in each report from the selected years. Subsequently, an average of all companies´ disclosure quality scores have been calculated for each year, thus representing the industry averages. The subcategories "circulatory systems" and "closed loop system" are shortened in the tables and referred to as "circular" and "closed loop" respectively. The following tables illustrate the industry average scores for each subcategory. In the tables, the bars represent the selected years and are differentiated by different colours, starting from the left with 2018. The y axis represents the averages of the industry's disclosure quality scores and the x axis represent the different subcategories.

In table 4.1, the results from the food industry are presented. In almost each subcategory, there have been an increase in content quality between 2014 and 2018. However, the averages fluctuate to some extent over the time period. For example, "waste reduction" were given higher scores in 2016 than 2017 even though there is a clear total increase over the time period.

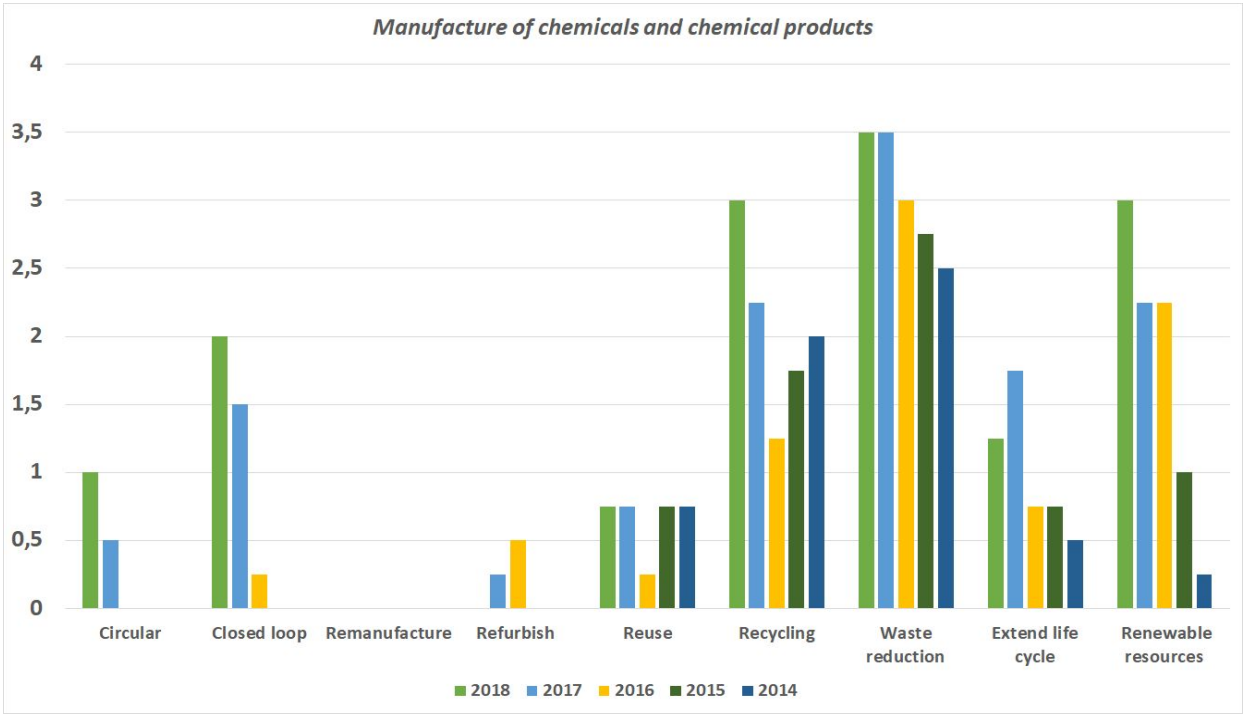
The subcategories that showed the highest averages were "waste reduction" and "renewable resources". Although, these subcategories showed high averages from the start in 2014. Moreover, the subcategories that showed the steepest quality increase in percentages were "extend life cycle" and "reuse", 618 percentages and 198,5 percentages respectively. These subcategories showed much higher averages in 2018 compared to 2014. Furthermore, two of subcategories, "closed loop system" and "remanufacturing" were essentially non-existent during the entire time period.

Table 4.1. Qualitative findings for the food industry



The subcategory averages of the companies within the industry for manufacturing of chemicals and chemical products are shown in Table 4.2. This industry shows similar pattern as the food industry, where a clear increase in averages in each subcategory except "reuse" and "refurbish" can be observed over the time period. Further, the average scores also fluctuate to some extent, "recycling" was given the lowest scores in 2016. The subcategories that showed the highest averages during the time period were "waste reduction", "renewable resources" and "recycling". The highest percentage increase in quality was undoubtedly "renewable resources" with 1100 percentages increase from 2014 to 2018. "Remanufacture" did not appear in any report.

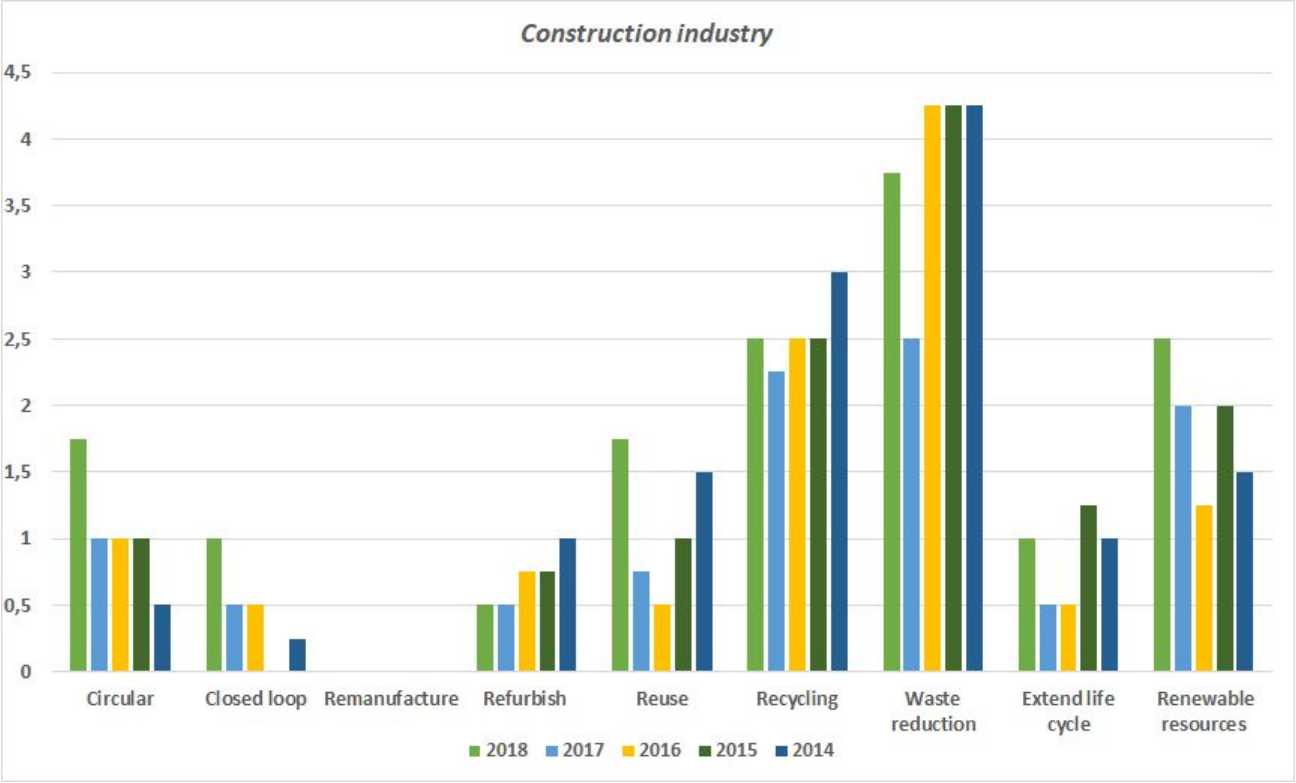
Table 4.2 - Qualitative findings for manufacture of chemicals and chemical products



The subcategory averages of the companies within the construction industry, are shown in Table 4.3. In some subcategories there is a clear increase in averages over the time period. However not all subcategories show an increase, in subcategories “refurbish”, “recycling” and “waste reduction” there have been an overall decrease over the time period.

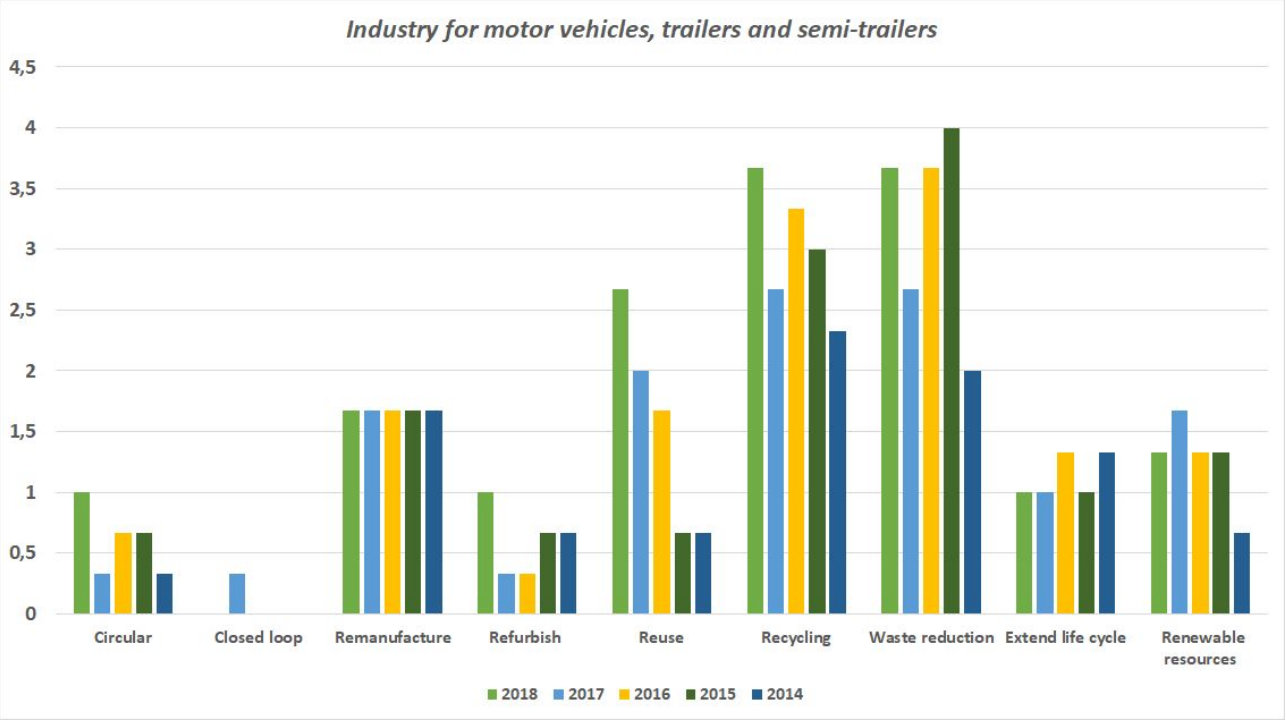
The results however, similar to former industries, show some fluctuation. For example, “reuse” was given lower scores in 2017, 2016 and 2015 than 2018 and 2014. The subcategories “waste reduction” and “recycling” received the highest averages during the time period. However, “circulatory system” and “closed loop systems” showed the highest increase in percentages from 2014 to 2018 with 250 percentages and 300 percentages respectively. In addition, “remanufacture” did not appear in any of the reports.

Table 4.3 Qualitative findings for the construction industry



The subcategory averages of the companies within the industry for motor vehicles, trailers and semi-trailers, are shown in Table 4.4 and referred to as “motor”. In most subcategories there have been an increase in averages from 2014 to 2018. Further, as former industries have shown, this industry also showed some fluctuation within the time period studied. The subcategories with the highest averages are “recycling” and “waste reduction”, followed by “reuse”. Regarding the steepest increase “reuse” showed the highest percentage increase in disclosure quality from 2014 to 2018, that is 298,5 percentages, followed by “circular” with 203 percentages. Moreover, the subcategory “closed loop system” only appeared in 2017 and with a low average.

Table 4.4 Qualitative findings for the industry for motor vehicles, trailers and semi-trailers



Taking all industries into account, there is empirical evidence supporting an increase over the time period in the subcategories in total. Table 4.5 illustrates all industries results over time. However, what subcategory that has had the highest increase depends on the industry. A common pattern among all industry are high averages in the subcategories “waste reduction”, “recycling” and “renewable resources”.

Table 4.5 Comparison of qualitative findings for all industries

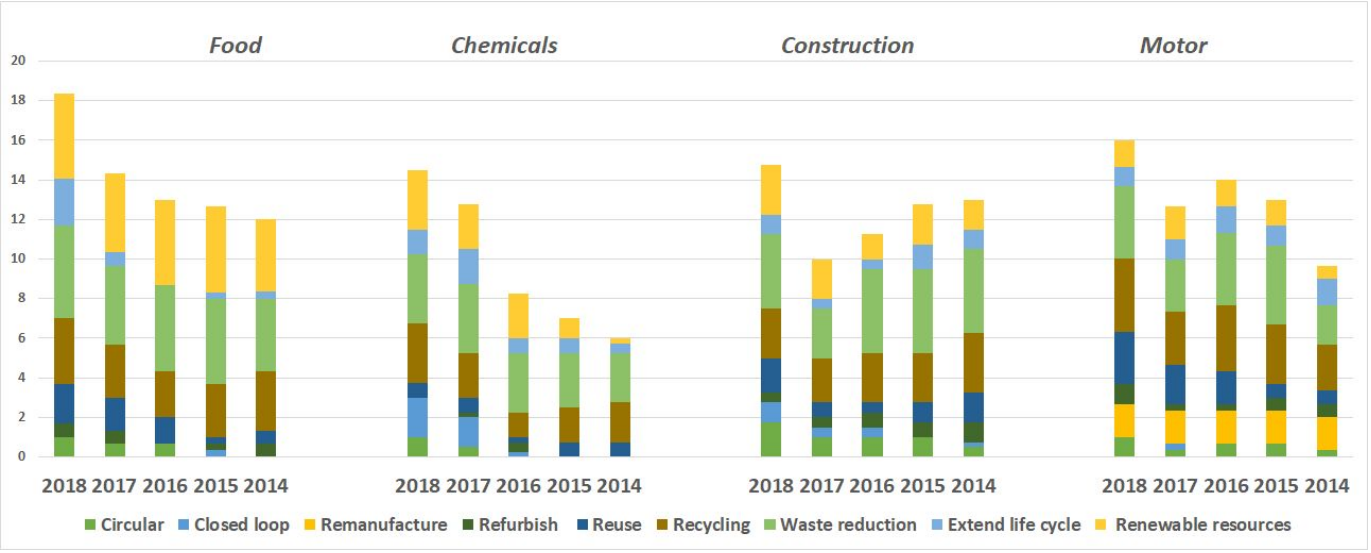
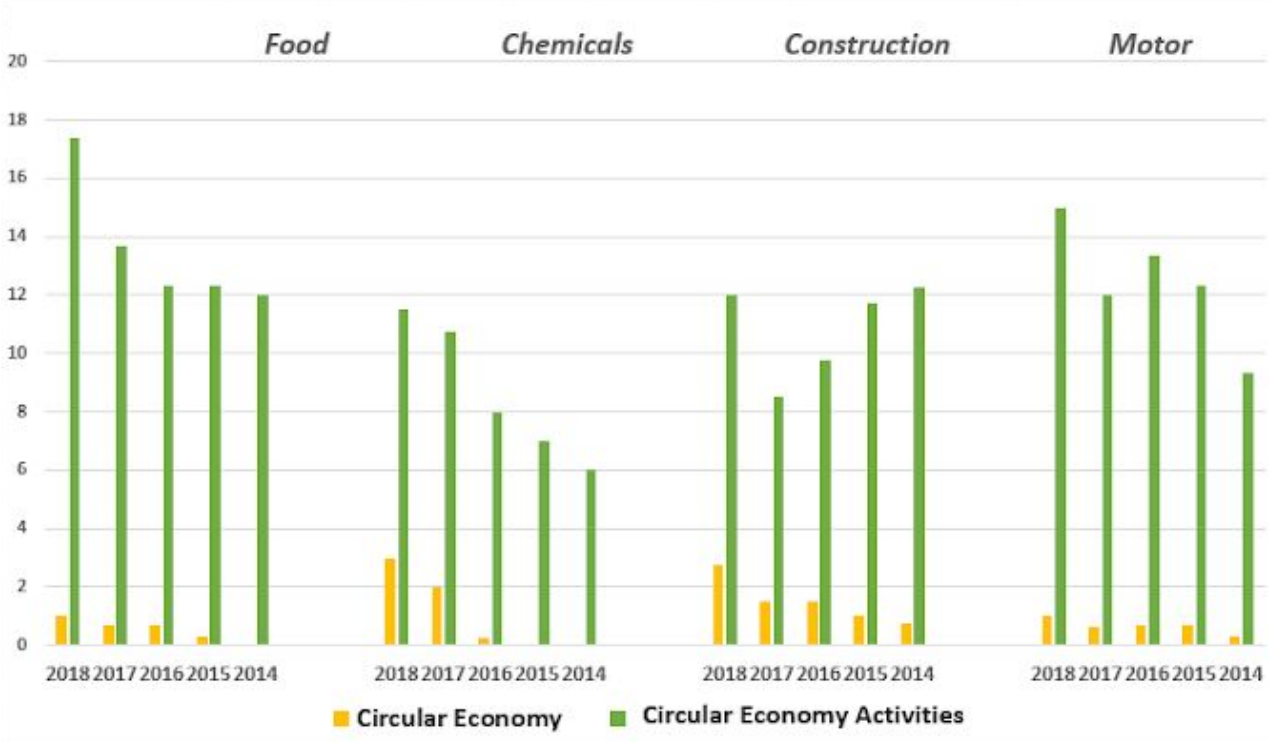


Table 4.6 visualise the increase in averages in the main categories by adding all subcategories related to the main category each year. It is important to note that the category "circular economy activities" consists of seven subcategories, compared to the category "circular economy", which consists of only two subcategories. However, the table provides an illustration of the development of both main categories to capture any patterns of increase or decrease. Thus, the table should not be used as a comparison between the two, but rather as a tool to evaluate each main category separately. Regarding "circular economy", there is a clear increase in all industries. In addition, the results indicate that in 2014, in many cases, this category was almost non-existent. On the contrary, in 2018, it was existent in each industry. "circular economy activities" show much higher averages, nevertheless they also had higher averages to start with in 2014. Together both categories show a positive trend in increasing disclosure quality.

Table 4.6 Comparison of qualitative findings for the main categories

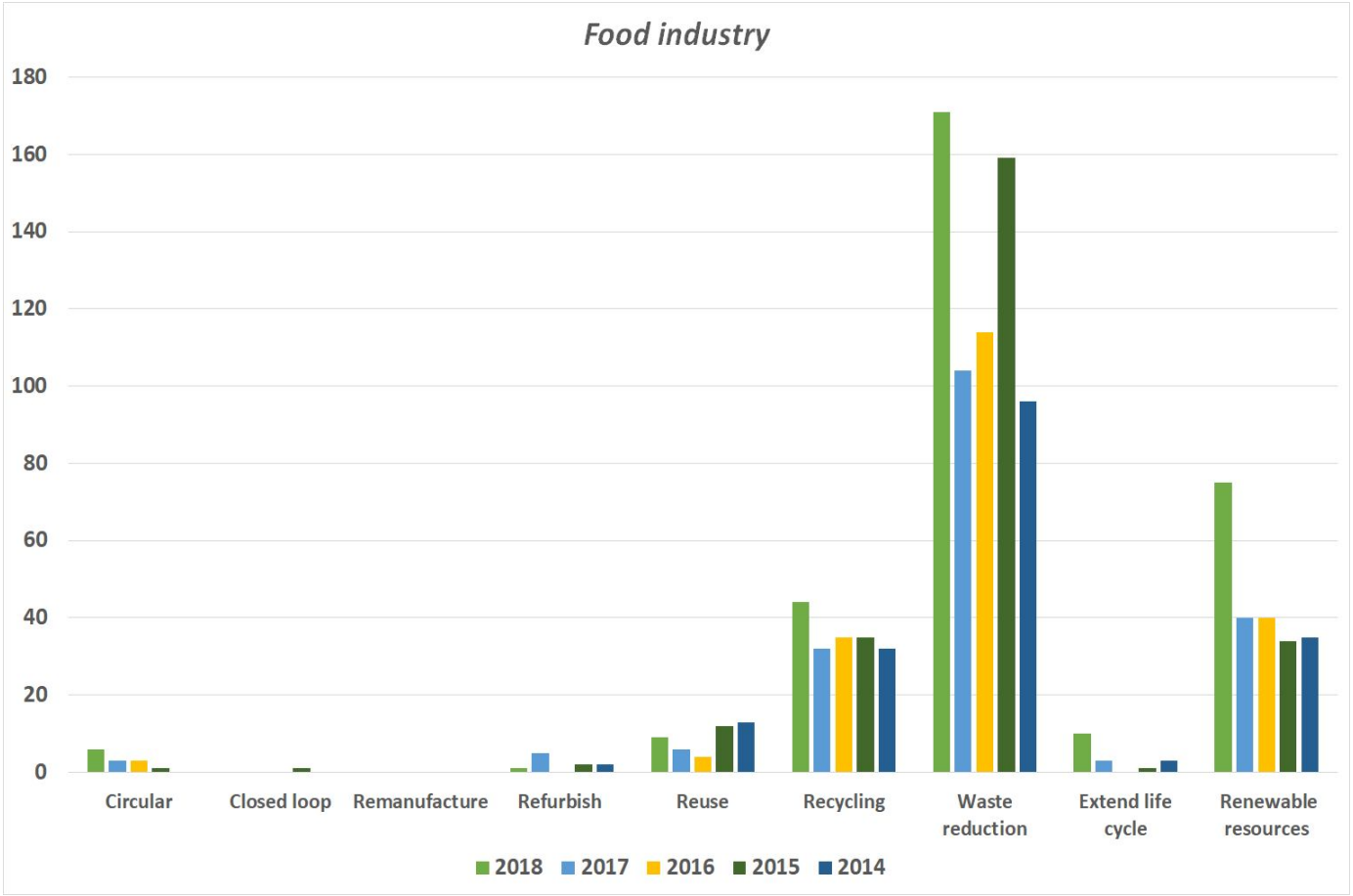


4.2 Quantitative results

In the following tables, the results from Step 3 in CONI are presented. For every company, the reporting frequency for each keyword representing the subcategories was calculated and compared over the time period. Tables illustrating the result will be presented for each industry. Again, the years are represented by different colours, starting from the left with 2018. The y axis will represent the reporting frequency and the x axis represents the different subcategories.

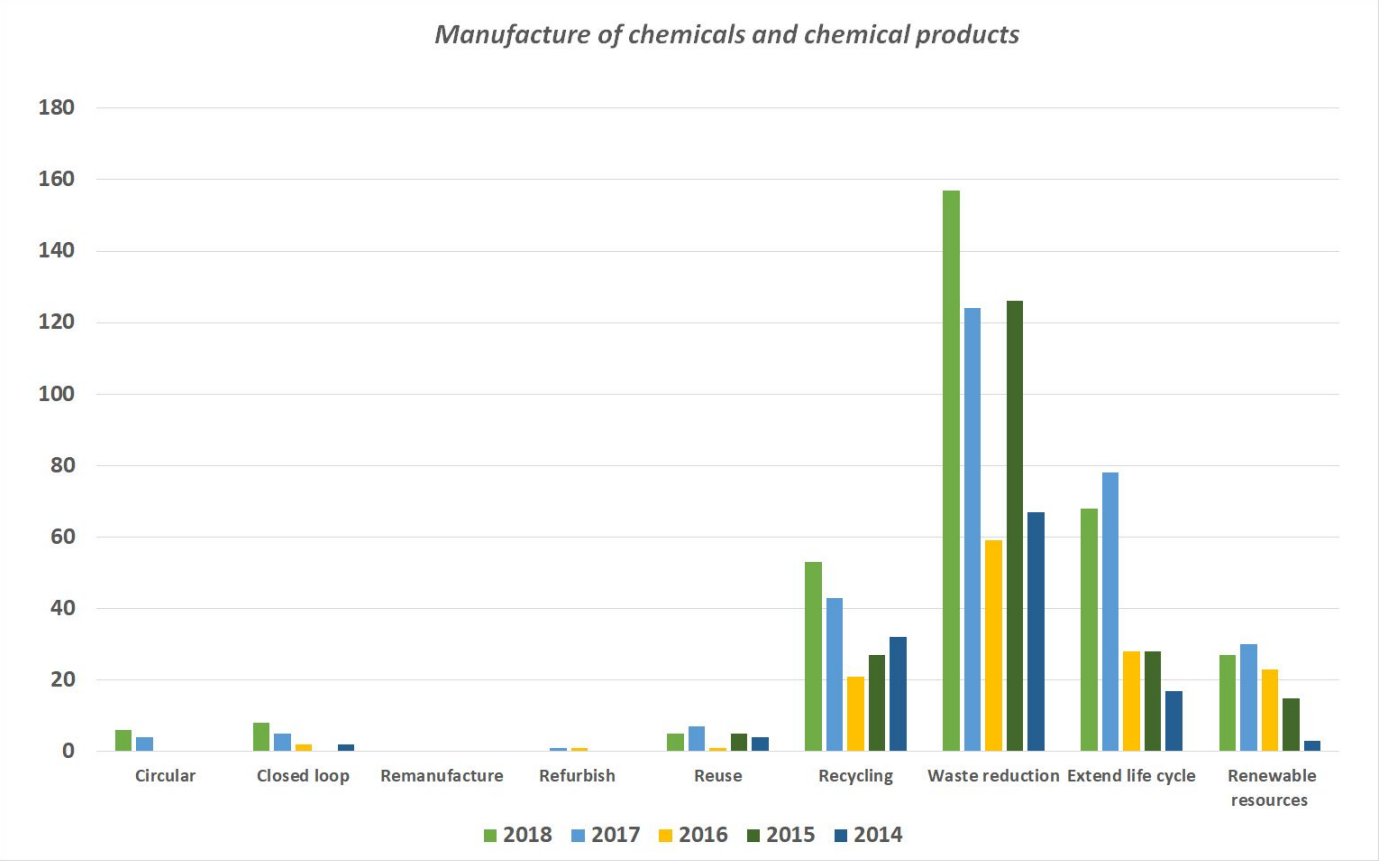
In Table 4.7, the frequency of the subcategories is illustrated in the food industry. Similar to the qualitative results in Step 2, there is an increase in most subcategories in 2018 compared to 2014. "Waste reduction", "renewable resources" and "recycling" are clearly dominating in the reports during the time period. Both subcategories related to the category "circular economy" had a low frequency. Although, it has increased from 2014 where no mention at all could be observed. Subcategory "remanufacturing" showed no existing frequency.

Table 4.7 Quantitative findings for the food industry



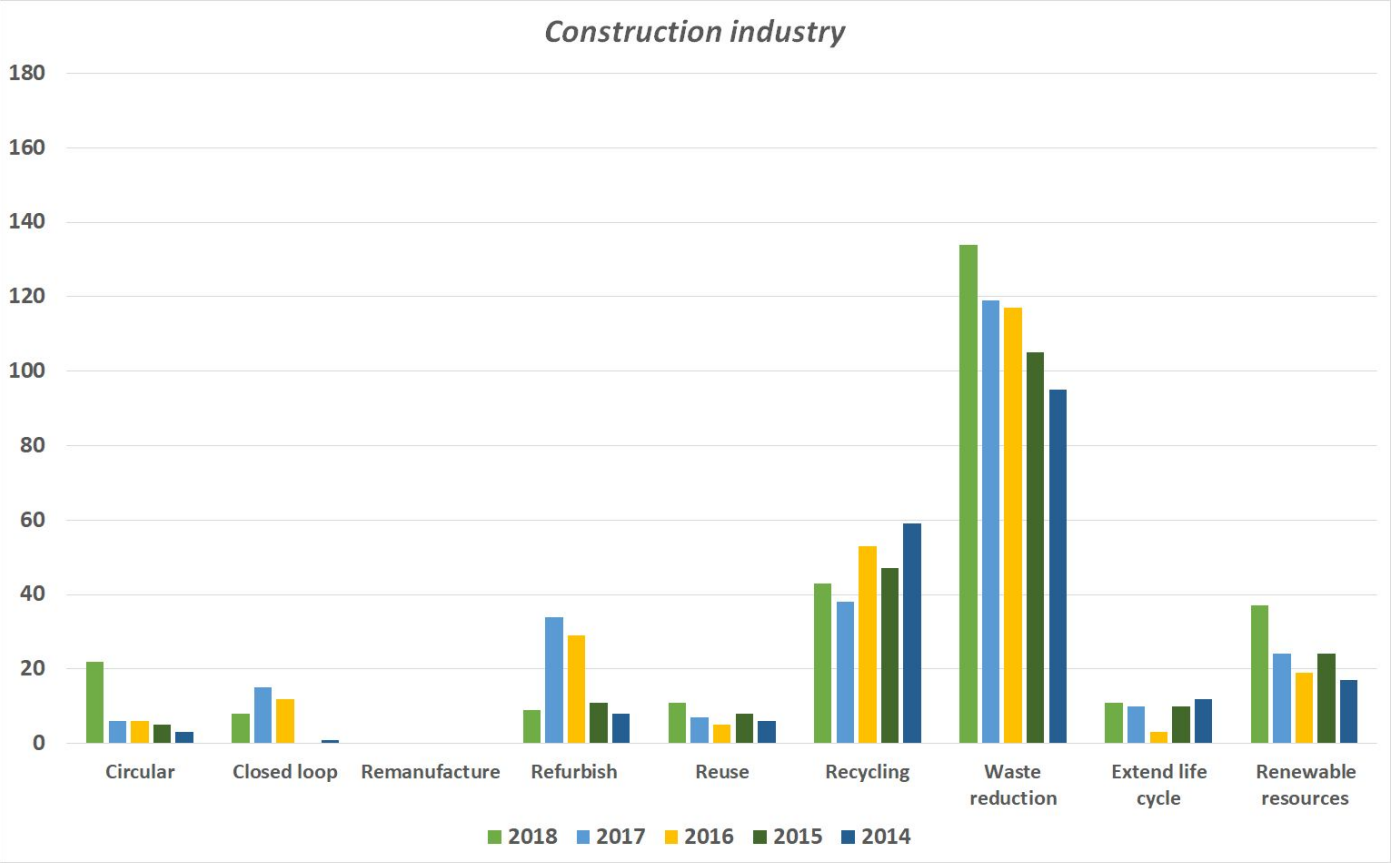
The quantitative results for the industry for manufacture of chemicals and chemical products are illustrated in Table 4.8. In the subcategories were notable frequency could be observed, it appears to be an overall increasing trend. “Waste reduction”, “recycling” and “extend life cycle” are the subcategories most frequently mentioned during the time period. Similar to the food industry, relatively low reporting frequency was observed for the two subcategories related to the category “circular economy”. However, they did not exist in the beginning of the time period. Both “remanufacture” and “refurbish” showed almost no existing frequency.

Table 4.8 Quantitative findings for manufacture of chemicals and chemical products



Regarding the construction industry, the reporting frequencies are shown in Table 4.9. The industry showed relatively high reporting frequency in several subcategories and notable increase in almost all of them. Like the other industries the construction industry showed relatively high reporting frequency on “waste reduction” and “recycling” in the reports. Furthermore, it showed the highest frequency in the category “circular economy” of all industries. Only “remanufacturing” had no existing frequency.

Table 4.9 Quantitative findings for the construction industry



The results from the industry for motor vehicles, trailers and semi-trailers are illustrated in Table 4.10. The industry showed relatively low reporting frequency in most subcategories compared to the other industries. In the subcategories were noticeable frequency could be observed, it appears to be an increasing trend in "circulatory system", "reuse", "waste reduction" and "renewable resources" from 2014 to 2018. However, all subcategories did not show the pattern. For instance, "extend life cycle" showed a decreasing trend from 2014 to 2018. The subcategory "waste reduction" was reported most frequent like the other industries. In contrast "remanufacturing" showed relatively high frequency.

Table 4.10 Quantitative findings for the industry for motor vehicles, trailers and semi-trailers

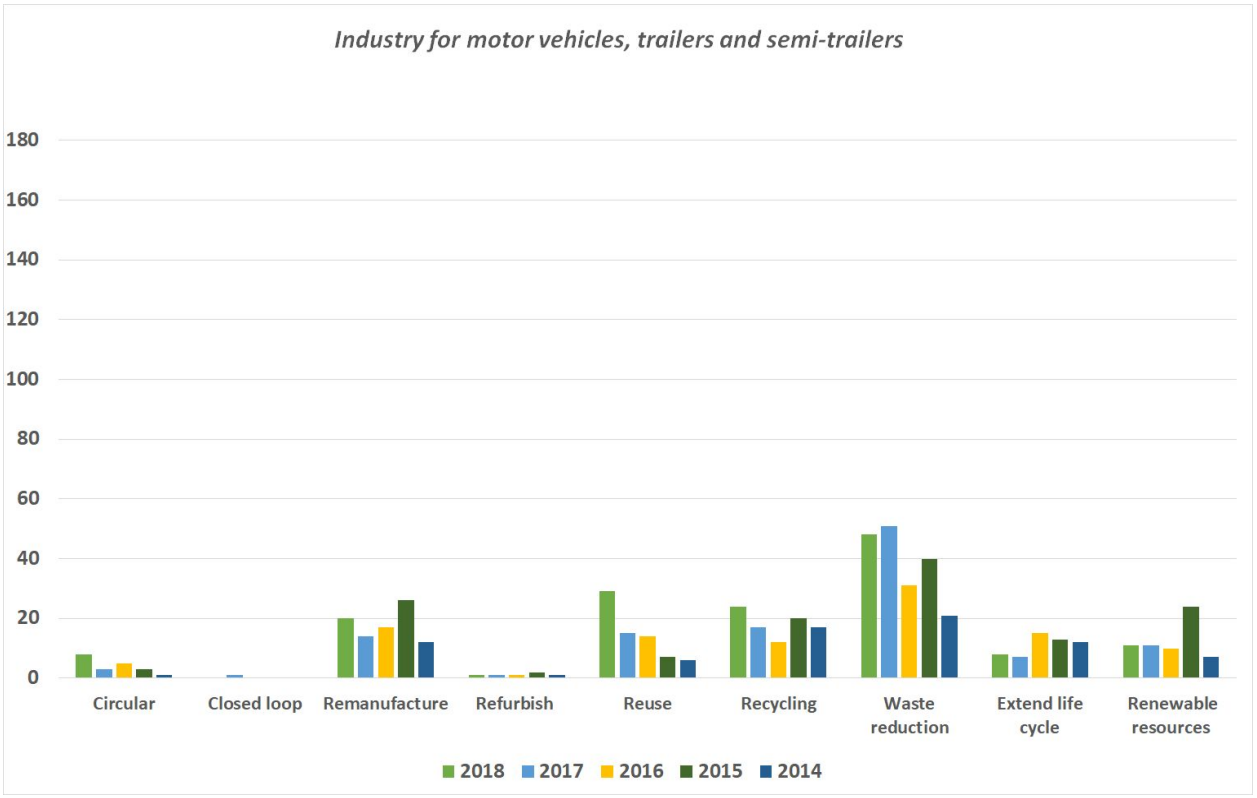
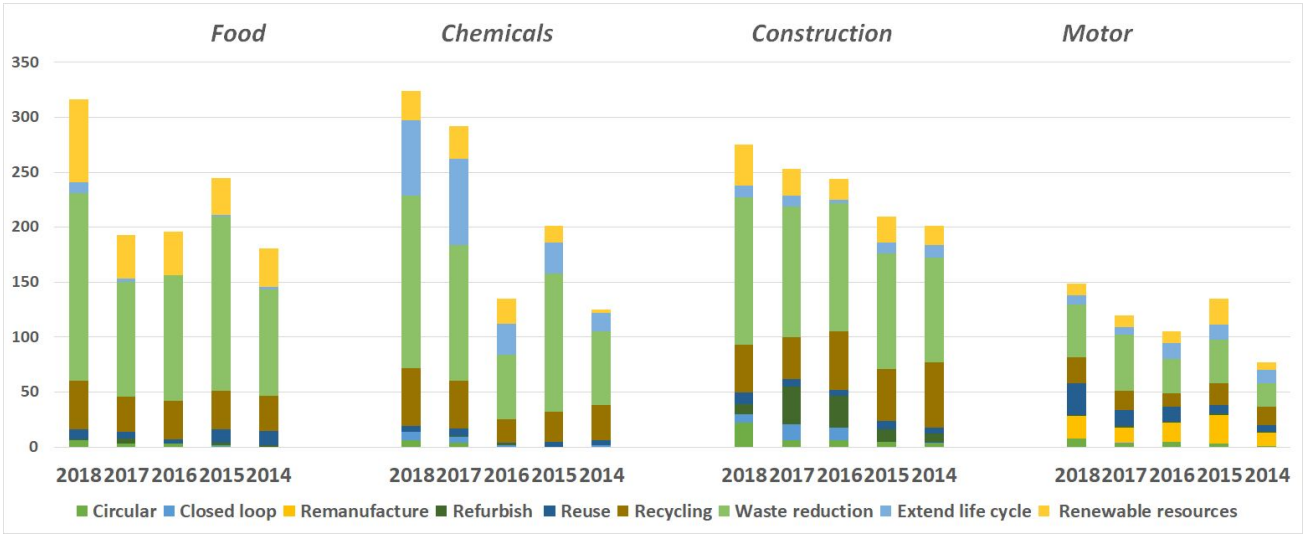


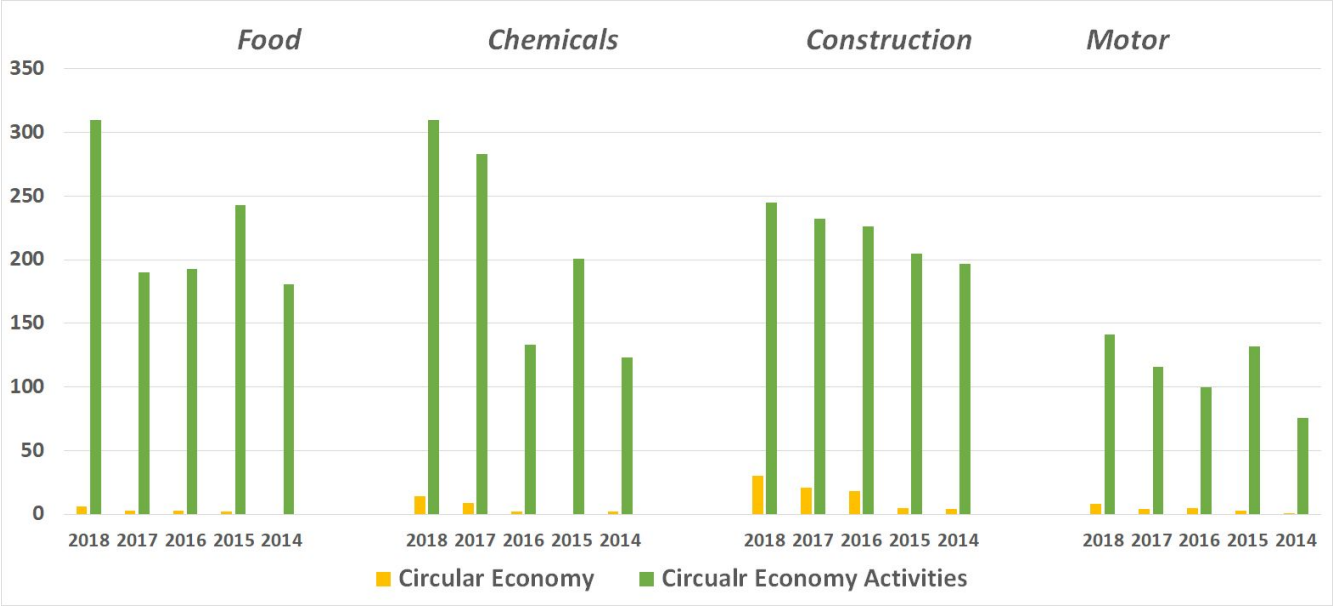
Table 4.11 illustrates a comparison of reporting frequencies in the respective industries. In all industries, an increase of the total frequency, all subcategories included, can be observed. Although this increase is not linear and can deviate certain years, the increase is notably high while comparing the year 2018 to 2014. However, what subcategory shows the highest increase depends on the industry. Commonly, "waste reduction" appears to be a dominating subcategory regarding frequency in the sustainability reports.

Table 4.11 Comparison of quantitative findings for all industries



In order to illustrate the frequency development of the two main categories in total, table 4.12 was conducted. Both main categories showed an overall increase over the time period. While the category “circular economy activities” showed rather high reporting frequencies in their opening values in 2014, the category “circular economy” was almost non-existent at this time. Further, “circular economy” showed a more even increase over the time period compared to “circular economy activity” which appeared to fluctuate to some extent between the years. It is once again important to note that one category had more subcategories than the other. Hence resulting in a misleading image if used as a comparison.

Table 4.12 Comparison of quantitative findings for the main categories



5. DISCUSSION OF EMPIRICAL FINDINGS

The analysis of the empirical results is discussed and presented in the same order as the research questions stated in the sections above. The overall trend is discussed followed by various explanations using the theoretical framework. Further, patterns between and within different industries are discussed, as well as the development over time. Lastly, the potential impacts of the European Union directive and Action Plan are discussed.

Regarding how the reporting of circular economy has developed, the empirical results indicate that fluctuation in disclosure quality has occurred within the given time period. That is, in all industries except the food industry, which shows a complete upgoing trend. However, it is important to realise that the content disclosure quality in total has increased if comparing 2014 to 2018. This is also the case for the reporting frequency in all industries. This increase might have occurred due to various reasons.

In accordance with legitimacy theory, a potential increasing trend in reporting of circular economy and its activities may mean that companies comply to a new norm to survive (Hoque, 2010). Companies might have realised that their legitimacy could be questioned if the trend continued without them being among the early adopters. Although, indicating a legitimacy change needs stronger proof and must be done carefully.

Institutional theory also supports the explanation of the essence for companies to acquire legitimacy and adapt to any new change in the institutional environment. Since an increase was observed among all companies within the same industry, it is possible that companies are influencing each other' behaviour and conforming to the new trend. Choosing to not conform and ignoring this trend, could harm the company and its long-term credibility (Yang et al., 2014, referring to Scott, 2018 and Yang et al., 2012). Furthermore, these empirical findings of institutional pressures affecting the reporting quality of disclosures related to circular economy has already been found in China (Wang et al., 2014). This provides an indication of relevancy and a likely explanation of this increase in Sweden as well.

According to stakeholder theory, companies might experience social pressure from their stakeholders. Companies that treat their stakeholders well are more likely to create more value (Kessler, 2013). Due to this, there might be incentives for companies to behave according to the views of the stakeholders. That is, if the stakeholders believe that circular economy is an important factor, the company might consider that as well. The companies included in the study are all large companies listed on NASDAQ Stockholm, which supports that they could be especially sensitive for stakeholder pressure for several reasons (Marton et al., 2018). For instance, to receive funding or keep up their stock prices. Hence, stakeholder theory can be part of the explanation for the increase in disclosure quality and frequency.

Further, even though the results showed an increasing trend, the overall quality did not appear to be at the highest level. This since many companies did not produce disclosure levels higher than two out of five on many of the subcategories, that is no numerical information such as specific goals or targets. However, many companies produced vivid descriptions, but as no numerical information was provided the quality of the content was valued lower.

The usage of CONI enabled both qualitative and quantitative measures on the reporting of circular economy. While comparing the qualitative and quantitative results, no direct relationship between these two could be found. In fact, the observations differ depending on the subcategory. For example, the subcategories "waste" and "recycling" received among the highest disclosure quality scores. Correspondingly, they also appeared to have the highest reporting frequency of all subcategories, indicating a possible relation. Although this may be true, this is not always the case for every subcategory nor for the total increase of all subcategories between the different years studied. In clarification, that more frequency guarantee higher quality, or vice versa, cannot be determined by the empirical results. Likewise, Beck et al., (2010) state that in CONI, a higher frequency does not imply higher quality, as quality depends on other factors.

Between the different industries, some common patterns could be identified. As previously stated, all industries showed higher disclosure quality averages and reporting frequencies of the subcategories in 2018 than 2014. Additionally, certain subcategories appeared to have rather high-quality disclosures in all industries. These were, "waste reduction", "recycling" and "renewable resources". Nevertheless, these subcategories had rather high-quality averages and frequencies to start with in 2014 in most industries. Hence it can be argued that these are relatively common activities to report and well known in the business sector.

Equally important, the quality of some specific subcategories seemed to be distinctively higher in certain industries. For instance, in the motor industry, the subcategory "remanufacture" demonstrated a quality disclosure average over 1.5 each year. Correspondingly the frequency each year was noticeable as well. On the contrary, the subcategory was non-existent in any other industry. The findings indicate that industry specific characteristics affect what circular economy activity is being reported. This includes affecting reporting frequency and disclosure quality of the specific activity. Another example of an industry specific finding is how the subcategory "waste reduction" appears to have the highest disclosure quality and frequency in the food industry. Even though "waste reduction" was fairly high in all industries, the food industry had noticeable higher numbers. Handling and minimizing food waste can be seen as something specific to the industry, thus supporting the evidence of the existence of such relationship.

Further, in 2018 the food industry had the highest reporting frequency considering all categories added. The same applies for disclosure quality where they received the highest score of all industries in 2018. Correspondingly, the food industry was the industry that by far emitted the largest percentage of greenhouse gases in the business sector in Sweden. It could be argued that this indicates a potential relationship between environmental impact and reporting of circular economy. However, to further investigate such potential relation, another study comparing the industries emitting the lowest percentages is to recommend.

According to Kessler (2013), some companies already consider sustainability political trendy and use some of its concept as a way of "window dressing", also known as "greenwashing". In this study, this might apply to the companies with low disclosure levels but high frequency of the subcategories. For example, compared to the other industries in 2018, the industry of manufacturing of chemicals and chemical products, showed the highest total reporting frequency count on the main category "circular economy activities". In 2018, in contrast, they had the lowest total quality disclosure score. Frequently mentioning these concepts without real substance could imply the attempt of "greenwashing" (Park, 2007). On the contrary, the motor industry showed relatively low frequency of mentioned words but produced similar quality, which could imply less suspicion of such activity.

While analysing the empirical results, some patterns could be observed over the time period. From the empirical results it is evident that both disclosure quality and reporting frequency are much higher in the main category "circular economy activities" compared to "circular economy". Although this may be true, it is important to note the difference in opening values in 2014. In fact, the subcategories of "circular economy activities" showed relatively high-quality disclosures and reporting frequency count to begin with. Unlike "circular economy" where both subcategories were almost non-existent in 2014. It can be argued that the knowledge in society regarding the terminology of circular economy has been fairly low in the past, explaining the lack of appearance in the reports in 2014. On the contrary, the terminology of the circular economy activities can be argued to be more established and recognized in society, explaining their higher values in 2014.

The European Union directive could also be one reason for the increase in disclosure quality and reporting frequency. However, all companies did provide some kind of sustainability report even before the implementation of the directive. As previously mentioned, some companies provided a standalone sustainability report, and some included it in their annual report. After the implementation of the directive, no real change could be observed regarding if companies decided to change their way of providing sustainability reports, that is, increased standalone reports or included in the annual report. Since the European Union directive does not give any detailed specifications on what or to what extent sustainability information should be included in the report, it makes it more complex while analysing to what extent it might influence the reporting itself. However, Wang et al., (2014) concluded

that mandatory disclosures improve reporting quality. Nonetheless, such conclusion could not be drawn by only observing the empirical results. Equally important, the directive regulates the reporting of sustainability but not circular economy in specific. Although, it could be applicable while explaining the increase in the category "circular economy activities" since these are usually referred to as sustainable actions. Regarding the category "circular economy" however, it may not be an equally valid explanation. In either case, additional factors must be considered while analysing the increase in disclosure quality and frequency.

According to the European Commission (2017), their Action Plan has contributed to an alleged increase in awareness regarding this terminology. This awareness might explain the increase in appearance of the term during the time period studied. However, such conclusions must be done carefully. It would be too simplistic to imply that this alone could explain such increase, thereby it demands a more complex analysis of changes in industry environment. Thus, the European Union directive nor the Action Plan alone cannot be used as an explanation of this increase. Although, their possible impact can neither be discarded.

6. CONCLUSION

This chapter is designed to summarize and answer the research questions. In accordance with the discussion, the conclusion will be presented in the same order. That is, following the order of the research questions. Lastly, recommendations for further studies will be presented.

6.1 Conclusions

The reporting of circular economy has increased during the five-year period studied. Adopting a circulatory thinking is becoming increasingly important for companies today. Stakeholders and institutional pressure regarding sustainability forces companies to conform to environmental trends in order survive in the marketplace. Accordingly, accounting information is being used as a communication tool not only for financial information, but sustainability efforts as well. As the concept of circular economy has gained importance, it has started to influence companies´ accounting information. Furthermore, as previous research has implied, while the terminology becomes more frequent and recognized in society, institutional pressure might motivate companies to implement more circular economy in their reports. That is, in hope of achieving legitimacy.

Regarding patterns within different industries further conclusions could be drawn. Indications of industry specific characteristics influencing the reporting could be found in the sample. In addition, three specific circular economy activities, “waste reduction”, “recycling” and “renewable resources” can be considered common to report by companies in all industries in the sample. Equally important, the industry that emitted the most greenhouse gases also showed the highest disclosure quality and reporting frequency. A possible relation could be suspected but not concluded.

The reporting of circular economy has developed over time and it is possible to conclude that there has been an increase in disclosure quality and quantity. Although some fluctuation in quality and quantity of reporting have been noted within the time period, there has been an increase comparing 2014 to 2018 in most subcategories.

As aforementioned, concluding why this increase has occurred cannot be explained using a single variable, nor by the empirical results. Its relation with the new European Union directive nor Action Plan cannot be determined. Although its contribution can neither be discarded as an explanation, it may be more likely to be the result of many contributing factors.

6.2 Recommendations for further studies

Firstly, given that the sample of the study consisted of large companies in Sweden, it would be interesting to investigate if the empirical results apply to small- or medium sized enterprises as well. It is possible that using smaller companies in the sample would provide different results. Notably, the European Union Action Plan was mainly targeting these companies and they do not have the same legal requirements regarding sustainability reporting. Further, it would be of interest to perform a study on unlisted companies, as they might experience less external pressure from stakeholders. Additionally, they are not regulated by the new European Union directive. A suggested comparison is recommended.

Secondly, the study could be extended to a larger sample, preferably including industries with different degrees of environmental impact to identify any significant differences. An extension of the time period could be performed as well, capturing the development over a longer time period.

Third, a similar study performed in other countries within, and outside, of the European Union is recommended. Enabling to capture the development from a global perspective.

Lastly, to strengthen the study's results, it is of essence to perform a regression analysis to seek general patterns from a more statistical perspective. Due to time constraints this was not performed on the empirical results in this study. However, it is a suggestion for further researchers within this field.

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8. Appendix

Appendix A

Hållbarhetsrapport

10 § Förvaltningsberättelsen för ett företag ska innehålla en hållbarhetsrapport om företaget uppfyller mer än ett av följande villkor:

1. medelantalet anställda i företaget har under vart och ett av de två senaste räkenskapsåren uppgått till mer än 250,
2. företagets redovisade balansomslutning har för vart och ett av de två senaste räkenskapsåren uppgått till mer än 175 miljoner kronor,
3. företagets redovisade nettoomsättning har för vart och ett av de två senaste räkenskapsåren uppgått till mer än 350 miljoner kronor.

Första stycket gäller inte ett företag som är dotterföretag om det och dess samtliga dotterföretag omfattas av en hållbarhetsrapport för koncernen.

Den som enligt andra stycket inte upprättar någon hållbarhetsrapport ska upplysa om detta i en not till årsredovisningen samt lämna uppgift om namn, organisations- eller personnummer och säte för det moderföretag som upprättar hållbarhetsrapporten för koncernen.

Lag (2016:947)

Appendix B

Subcategory	Keyword 1	Keyword 2	Swedish equivalent to keyword	Swedish synonym
Circular system	Circular		Cirkulär	
Closed loop system	Loop + closed	Circuit	Slut* system	
Remanufacture	Remanufactur*		Återtillverkning / renovera	Förnya
Refurbishing	Refurbish*	Remodel	Renover*	
Reuse	Reus*		Återanvänd*	Återbruka
Recycling	Recyc*	Reprocess	Återvinn*	Regener*
Wast reduction	Waste	Excess	Avfall	Överskott
Extend life cycle	Extend+Life+Cycle		Livs cykel	
Mainteinance	Maint*	Preservation	Underhåll*	Bevar*
Repair	Repair	Restore	Repar*	
Renewable resources	Renew*		Förnybar*	
Different endings *				
each word indepently +				
Choices;				
Keyword 1 - the word				
Keyword 2 - synonym if relevant				

Appendix C

Disclosure type	Definition
0	No information related to the category; no mention
1	Disclosure addresses issue related to category definition; pure narrative
2	Disclosure addresses issue related to category and provides details; pure narrative
3	Disclosure addresses issue related to category in numerical way; purely quantitative
4	Disclosure adresses issue related to category in numerical way, including qualitative explanations; narrative and quantitative
5	Any numerical disclosure to the category including qualitative statements demostrating year comparisions; narrative, quantitative and comparable