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Circular Economy and Sustainable Value Creation in the Construction Industry:

A case study on how circular economy affects the activities in the value chain in a Norwegian construction organization

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Sincerely,

Anders Holberg Hansen and Stian Køhn Berget

Abstract

The construction industry is among the largest industries in Norway, and it accounts for a significant portion of the country's emissions. Over the last decades, global material consumption has rapidly increased, as a consequence of materials and resources not being fully utilized. This has had several environmental implications, and the construction industry is one of the largest contributors to this.

There is great potential for improvement, and there is a need for adequate material efficiency strategies to be implemented. Circular economy is a strategy that seeks to utilize resource efficiency, thus minimizing resource input by changing the activities in the value chain. Consequently, it aims to change a traditional linear economy to a more circular one, entailing reuse, recycling and reduction of materials and resources.

Based on this we decided to do a qualitative case study and look into a large and well-known Norwegian construction firm to see how the circular economy and sustainability are affecting the company. As a result, we formed the following research question:

How have the focal firm's activities and value chain(s) developed and changed in the last years, towards a different business model and value creation, given the circular economy and sustainable approach it has been pursuing?

To answer our research question, we further divided our study into four different research sub-questions, each examining a core topic of our research question. Our findings showed that there is a considerable change happening in the activities, throughout the entire value chain. This is exemplified by the focal firm's Environmental Parks which have turned two previously separated markets into one single new market. The traditional value chain framework, proposed by Porter (1985), does not necessarily fit in the construction industry moving forward. Furthermore, we have recognized several barriers to this implementation—most notably cultural barriers, rigid regulatory systems, and cooperation among actors.

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Chapter 1: Introduction

Over the last 50 years, the world has changed rapidly and experienced an economic growth that has never been seen before. The high economic growth has coincided with an increasing world population and increasing consumption. This trend is only expected to continue in the years to come, due to an expanding middle class and more people being lifted out of poverty. Increased consumption is already the primary driver of increased global material use (UNEP, 2016). Greenhouse gas emissions (hereafter GHG) from material production have more than doubled in the last 20 years, rising from 5 Gt CO2 equivalents in 1995 to more than 11 Gt CO2 equivalents in 2015. Moreover, global material consumption has tripled in the last three decades, and annual global extraction of materials and resources has increased from 23.7 billion to 70.1 billion tons between 1970 and 2015. Changes in consumption patterns, population growth, and economic growth have all contributed to this (IRP, 2020; UNEP, 2016).

As a result, we see that raw materials and global resources that are extracted are not being used to their full potential. This, once again, has environmental implications and will contribute to climate change. For instance, in 2010, 30 billion tons of material extracted globally were used to produce only 10 billion tons of directly traded goods (UNEP, 2016). Direct emissions from material production processes account for more than half of the carbon footprint. Construction and manufacturing each account for up to 40% of global GHG emissions (IRP, 2020). The majority of construction materials are used to create capital goods such as buildings and infrastructure. GHG emissions from construction, operations, and demolition are expected to decrease by 35 to 40 percent in the G7 countries by 2050 if material efficiency strategies are implemented (IRP, 2020).

These material efficiency strategies will be critical in reducing the demand for energy-intensive materials, making better use of materials and resources, and ultimately reducing GHG emissions. A circular economy has been proposed by many as a solution to reduce waste generated by materials and to reduce the use of raw material input (IRP, 2020; Velenturf et al., 2019). The circular economy can be defined as an economy in which the value of products, resources, and materials is

kept in the economy for as long as possible by recycling and minimizing waste (IRP, 2020). According to the leading Ellen Macarthur Foundation, "A circular economy is based on the principles of designing out waste and pollution, keeping products and materials in use, and regenerating natural systems" (Ellen Macarthur Foundation, n.d.).

However, the circular economy is still a developing research field. In this master thesis we will examine the Norwegian construction industry and how the circular economy can change and develop it. The construction industry in Norway today is estimated to account for 40 percent of total power consumption and 25 to 40 percent of GHG emissions (Bygballe et al., 2019). Furthermore, the construction industry accounts for approximately 25% of total waste generated in Norway (SSB, 2020). There is plenty of room for improvement when it comes to different measures to deal with and mitigate a high amount of energy use, GHG emissions, and waste production. In this master thesis, we will investigate how the circular economy in a sustainable value creation setting can assist the Norwegian construction industry in improving material use, lowering GHG emissions, and recycling waste. We will examine this by looking into how this changes and impacts the activities throughout the value chain.

Chapter 2: Research question and aim

This master thesis was in its initial stages related to the WAVA-project and the impact circular economy can have on the economy. The WAVA-project aimed to develop a circular economy for mass handling in the construction industry in the Oslo area. The project was a joint collaboration between Oslo Port and researchers from BI Norwegian Business School, as well as two large Norwegian construction firms (Bygballe et al., 2021). This concept of circular economy is gaining traction and importance in an ever-changing world. In a circular economy, many different activities in the value chain of construction firms are bound to change. As a result, there is a need to further develop a better use of materials, such as how waste can be recycled and used in a more sustainable and renewable manner. This study's main focus is on how the activities in the value chain differ and change from a linear economy. Furthermore, we want to investigate how these activities can alter the company's business model and create new opportunities to maintain value in a

sustainable approach. Therefore, it is also worthwhile to investigate how the business model affects the value chain, which has implications for capturing value in a circular economy. With the identification and investigation in mind, we arrive at the following research question:

How have the focal firm's activities and value chain(s) developed and changed in the last years, towards a different business model and value creation, given the circular economy and sustainable approach it has been pursuing?

The importance of activities is highlighted in this research question, as well as how they will be affected by the business model, value chain, and implicitly how value is created in a two-way stream. Thus making it an investigation into how the value chain in a circular economy might differ from what pertinent literature may take for granted.

In order to answer the research question above, we introduce four different research sub-questions in order to examine the different areas of the research question. As a point of clarity these are already provided here, but will be further explained in *Chapter 5*. They are as follows:

1. What impact will the circular economy have on the activities along the value chain?
2. How does a business model focused on sustainable value creation connect to circular economy?
3. Have sustainability and sustainable development goals in the construction industry affected the change in activities in the value chain?
4. What are the barriers to implementing circular economy ideas in the value chain in the construction industry?

The thesis is structured as follows: First, it will provide a literature consisting of two different chapters—one part that covers more traditional and academic literature, and another that covers more general and conceptual literature. These are divided into *Chapter 3* and *Chapter 4*. Following this, the next chapter will provide criticisms and discussion of the literature from *Chapter 3* and *Chapter* 4, and the research sub-questions mentioned above. Next, it will provide a chapter on

methods, including research design, data collection method, and the quality of the research. Thereafter, *Chapter 7* will provide our findings, divided into the research sub-questions from *Chapter 5*. Following that, *Chapter 8* will provide a discussion of the findings and its relation to the literature. At last, the thesis will provide a conclusion to our research question, the limitations of the study, and guidance for future research.

Chapter 3: Literature review

In this chapter, we will go through relevant literature surrounding our research question. As such this chapter will cover more traditional academic literature with an emphasis on the activity-based view, value chains and the criticism of these concepts. Furthermore, it assesses pertinent literature on circular economy and sustainable value creation.

3.1 Activity-based view

According to Porter (1996), the activities that go into the making of a product are the basic units of competitive advantages. For the firm to gain competitive advantage it needs to obtain operational effectiveness. This means performing these activities in a better or faster way, or with fewer inputs than the rivals. The essence in a strategy is in the activities to the organization. Strategy is when a firm chooses to perform similar activities differently or better than the rival or to perform entirely different activities than the rivals. Otherwise, the strategy will not be any more than a marketing mantra that will not cope with the competition in the market (Porter, 1996). Or in Porter's own words: *"the essence of a strategy is to perform activities differently than rivals do"* (Porter, 1996, p. 9).

Richardson (1972) explains the importance of activities in industry firms. According to Richardson, we can look at the industry as carrying out a large number of different activities. These activities could be related to discovery and estimations of what the future will hold, research, development, or the design of products. But these activities could also be related to the execution and co-coordination in the organization process and physical transformation of the organization, as well as marketing of goods, to name a few (Richardson, 1972). Hence, Richardson (1972) is talking about the entire value chain of an organization as Porter presented later

in 1985 (Porter, 1985). Furthermore, the organizations with the right capabilities will carry out these activities in the best way. These capabilities can be material technology, such as cellulose chemistry, civil engineering, and electronics. However, they can also be skills in marketing, knowledge, or the reputation that the organization has in the market. With the right activities the organization will get the best out of these resources (Richardson, 1972).

Next, the activities in an industry need to be complementary. Complementarity in this case is when the activities presents different phases in the process of production and will therefore require some way of co-coordination (Richardson, 1972). However, it is also important that this concept of complementarity and co-coordination also encompasses the relationship between marketing, research and development, and human relations in the organization. These are also known as support activities in the value chain (Porter, 1985, 1998; Richardson, 1972).

The complementarity and co-coordination between the activities in an organization can also be seen as the *fit* between the activities. It is the way the activities in a firm or organization interact, reinforce, and strengthen one another (Porter, 1996). The fit between the activities will impact competitive advantages, as well as sustainability in the organization. This will make it harder for competitors to imitate the activities in the value chain in an organization, as its competitive advantages derive from the fit between the activities. Since the activities will affect one another, and by having a strong link and fit between these activities, they will instead reinforce one another. Therefore, with a high degree of fit between the activities, the organizations will attain a value chain that is as strong as its strongest link, which ultimately can prohibit competitors to imitate the activities (Porter, 1996).

3.1.1 The value chain

Porter's (1985) value chain is an important tool to analyze the logic of firm-level value creation through the activities in the firm. The purpose of the value chain analysis is to break down the firms' important strategic activities and look at the impact they have on the value and cost in the firm (Stabell & Fjeldstad, 1998). The value chain model is a long-linked technology, where value comes from the input resources that become the product. Raw materials and intermediate products are

often transported to the manufacturing facility, which transforms these resources into a product that is then sold to customers (Porter, 1985, 1998; Stabell & Fjeldstad, 1998). For this to work, the different activities in the value chain need to work together and be coordinated with a good fit as mentioned earlier (Porter, 1996). The basic assumption in the value chain model is that the activities are building blocks to create the valuable product that the customers are willing to purchase (Stabell & Fjeldstad, 1998). Value chain configuration is separated into two levels: the primary activities and the support activities. The primary activities are directly involved in the production and the physical product the firms sell to the customers. Though, the support activities enable and improve the performance of the primary activities. Therefore, the importance of different activities that have different roles and serves as building blocks in the value chain, are essential to provide value creation in the firm (Porter, 1985, 1998; Stabell & Fjeldstad, 1998).

3.1.2 Criticism of the value chain and other related concepts

However, there is some criticism or revivalism towards the value chain and activity-based view, that stems from a resource-based view. This is also a framework used to analyze firm level factors (Sheehan & Foss, 2009). Simply put, the resource-based view examines the resources in the company and emphasizes that they are the reason for competitive advantages. However, these resources need to have certain characteristics, and they need to be valuable, rare, difficult to substitute or inimitable and well-organized (Barney, 1991; Wernerfelt, 1984). Hence, it is argued that the activities are the key link between the resources and the strategic position they have. Resources become valuable when they are put into the activities. These activities can create a higher value for the resource, lower production costs and can create a higher utilization of the resource. The best way to comprehensively explain value creation in a firm is to combine these two. Resources will provide some advantages, but it is through the activities that the firm achieves the competitive edge over competitors (Sheehan & Foss, 2009).

Stabell & Fjeldstad (1998) criticized Porter's value chain and ideas, and further developed the activity-based view in analyzing firm level factors and analysis of value creation, through the firm's activities. In their research they found it difficult to apply the value chain framework. It is well-suited to describe the ordinary

manufacturing firm, but less suited to analyze firms in for instance, the service industry such as consulting firms. In addition to the traditional value chain from Porter (1985), Stabell & Fjeldstad (1998) suggest two new models: the value shop and the value network.

In the value shop model, the firms create value by using resources such as knowledge and activities to solve the customer's problem, such as consulting firms. In the value shop the primary activities are not linear as in the traditional value chain, but more circular. The main activities are problem finding, problem solving, choice, execution and control, and evaluation. These are repeated until customer's problem is solved, and is one of the most important factors in value shops. The support activities here are the same as in the value chain (Stabell & Fjeldstad, 1998).

In the value network the firm's main task is to link clients or customers who are or wish to be interdependent. It is important that the firms provide a networking service, and the firm itself is not the network. Good examples of firms like this are telephone companies, insurance companies, banks, and big platforms such as Amazon and Facebook. In the value network the primary activities consist of three different activities. First, there is network promotion and contract management between the members, and the activities are mostly focusing on selecting and inviting new customers. Second, there is service provisioning, where the activities are focused on maintenance and service towards the customer. The third and final activity is network infrastructure operation, which consists of maintaining and running the physical network infrastructure. The support activities in the value networks are also the same as in the value chain (Stabell & Fjeldstad, 1998).

Stabell & Fjeldstad (1998) argue that the concept of value chain analysis in value creation can be used beyond traditional manufacturing firms with the introduction of two additional ways to look at value creation through the firm's activities. The context of activity sequences in these firms is frequently linear and best suited to the value chain. This additional way to look at the activities in the firm will enable the activity-based view to be more adaptable to change and development in today's firms (Stabell & Fjeldstad, 1998).

Furthermore, the circular economy will put a strain on Porter's (1985, 1998) value chain. There is a shift taking place in traditional industries such as manufacturing and construction, which have traditionally been described using a traditional value chain. After meeting their purpose, the end products enter the value chain via recycling, remanufacturing, and reuse of the materials or resources used in production (Bygballe et al., 2019; Nußholz et al., 2019, 2020; Velenturf et al., 2019). As a result, not only have activities in the traditional value chain begun to change, but the value chain itself has begun to change, and in some organizations has already done so. Circular economy and sustainable value creation will cause firms to alter their activities in order to meet future technology, innovation, and goals, which will become increasingly important for organizations (Velenturf et al., 2019) .

3.2 Circular economy

A more recent concept in comparison with the term "sustainability," much of work and research done on circular economy has been conducted by the Ellen Macarthur Foundation (Bygballe et al., 2019). The foundation has produced several reports in collaboration with McKinsey and Company since 2012 (Ellen Macarthur Foundation, 2013a, 2013b, 2014). The first volume of the three reports emphasizes that a linear economy is limited and shows the flaws of such an economy in regard to how resources erode over time. It also explains how value creation can be pursued with a circular economy business model. The report identifies four different groups for value creation. First, the power of the inner circle. Second, the lengthening life span of a product. Third, the power of cascading use. Fourth, the power of pure circles (Ellen Macarthur Foundation, 2013a; Murray et al., 2017). The third volume is building on how different types of input resources yields a different outcome in manufacturing processes. For instance, they distinguish different materials into different categories—if they lack systematic reuse, if they are bi-products that can mitigate the use of new products or if they are fully restorative by nature and can be reused (Ellen Macarthur Foundation, 2014). Furthermore, The Ellen Macarthur foundation defines circular economy as "an industrial economy that is restorative by intention and design" (Ellen Macarthur Foundation, 2013, p. 14, 2013, p. 23).

Later, several other definitions (see table 1 for definitions) have contributed to a broader definition of circular economy (Geissdoerfer et al., 2017). Building on the definitions of Webster (2017), Bocken et al. (2016) and the Ellen Macarthur Foundation (2013), Geissdoerfer et al. (2017) define circular economy as "*a regenerative system in which resource input and waste, emission, and energy leakage are minimized by slowing, closing, and narrowing material and energy loops. This can be achieved through long-lasting design, maintenance, repair, reuse, remanufacturing, refurbishing, and recycling.*" (Geissdoerfer et al., 2017, p. 6). As a consequence, circular economies can be perceived as a condition for sustainable development (Bygballe et al., 2019; Ghisellini et al., 2016; Murray et al., 2017; Webster, 2017). More specifically, the focus on reusing and recycling materials and building a regenerative system implies that the system itself should be in focus for achieving value creation rather than improving resource utilization (Murray et al., 2017).

Moreover, the circular economy has been proposed by many as a solution to minimize raw material input and waste generation in production or manufacturing and construction industry (Nußholz et al., 2020; Velenturf et al., 2019). Circular economy is often seen as an umbrella term for various ideas in innovating to both keep and redefine products in the market, as well as services that remove waste from the value chain, and reduce negative impacts from production. Therefore, the preservation of technical, functional value resources, materials and products could be viewed as a tool for new value creation of economic, social and environmental net-benefits (Velenturf et al., 2019).

However, by circulating more material in different firms' and the economy's value chains, there will be a greater demand for energy. Energy will be essential, and balance of it will be critical, because a circular economy, with its system-level, will have a negative net impact on the environment. As a result, a further development of renewable energy sources will be one of the core building blocks in a circular economy (Velenturf et al., 2019).

The business models will be important for material reuse and economic viability. Business models define a set of components and activities that allow us to map the

organizational architecture that create, capture and deliver value (Lanzolla & Markides, 2021). These business models need to gain competitive products that meet the regulatory standard and deliver strong sustainable value creation to firms and the economy. Therefore, it will be valuable to look into the innovation process, such as how firms create value, at the same time, as they change their activities and the value chain while adhering to a circular economy principle. Firms need to do this through new products, technologies and development and change to different value chains and value chain networks. As a consequence, through these activities the firms can look at what values and costs the business model creates to the firm, customers, and the environmental perspectives (Nußholz et al., 2019, 2020).

Already, the circular economy is starting to affect and develop the value chain in the construction industry, as well as in other ordinary value chain industries that develop products from materials and resources. These can be organic, such as agricultural production, but also in inorganic, such as metal and mass (Bygballe et al., 2019; Nußholz et al., 2019, 2020; Velenturf et al., 2019).

Consequently, there are some risks when transitioning to a circular business model (Nußholz et al., 2020). Many studies especially draw attention towards the risk from the uncertain pricing of secondary materials and high costs towards labor and reverse logistics. Very often are the total costs dependent on the value chain structure in the firms, therefore it is important to pinpointing transportation distance, site conditions, and quantities of material as main activities of cost in the specific reuse and recovery of material and resources. Therefore, it can be needed to add new value creation activities in the value chain towards recovery and reuse processes (Nußholz et al., 2020). Furthermore, research show that circular economy implementations had a huge potential to reduce total life cycle costs, it improves competitive advantages and innovations, as well as user value and reduced environmental impacts from raw material and waste, this will also have impact on the corporate image and marketing in firms (Nußholz et al., 2019, 2020).

Velenturf et al. (2019) proposed a production-consumption system or an integrated resource and material flow diagram for the circular economy for natural geological chemicals and/or biological processes in their article. Natural resources and

materials are used by businesses to create industrial materials and products that are used in the production-consumption system. With a circular economy in mind, the production system is optimally designed. As a result, the design is the model's first stage. This is an important stage because the design determines 80% of the product's environmental impact and benefits over its entire lifecycle. Sharing, reusing and repairing, remanufacturing, and recycling are all encouraged by the design. All of this will lead to higher resource and material productivity per unit produced, as well as net-positive environmental and social impacts from resource use (Velenturf et al., 2019).

Further down the production-consumption chain, products and materials that cannot be recycled in the manufacturing process must be stored in a controlled environment or used for energy recovery. This could be due to the industry's lack of long-term waste management infrastructure. These products and materials, which must be stored in a controlled environment now or in the future, can be recovered and recycled to speed up the process of extracting material from a natural system that can be reused in the industry value chain. The unusable material will then be returned to an uncontrolled biophysical environment. There will be some uncontrolled leakages of industrial materials in this system, which will end up in the environment as pollution and waste. If at all possible, this should be stopped. It is difficult and costly to collaborate on environmentally damaging designs like this, but with new building infrastructure, it is possible (Velenturf et al., 2019).

As a consequence, when examining how the circular economy affects the value chain, activities, and resource and material lifecycles. Velenturf et al. (2019) present a production-consumption system that fits well into understanding how a circular economy will affect the linear value chain as we know it today and the various activities. It also demonstrates how the lifecycle of materials and resources evolves to become circular and retained within the system rather than waste and discarded. This production-consumption system is already being observed in firms in the construction and general industry (Bygballe et al., 2019; Nußholz et al., 2019, 2020; Velenturf et al., 2019). Construction and other industries are commonly regarded as typical value chain firms, with a series of linear activities that produce or build the product and then finish it. This is changing, and the traditional value chain is no

longer linear, but rather circular. This will have a significant impact on how we look at these types of value chain companies in the future, as well as how we look at the various activities to see how sustainable value creation is made in these firms.

Authors	Definition of circular economy	Key focus
Ellen Macarthur Foundation (2013a, p. 14; 2013b, p. 23)	*An industrial economy that is restorative by intention and design*	**Extensive work on circular economy, with several publications from the foundation. These two are focusing on the impact on society, including policy makers relationships and cooperation and academia. One noteworthy remark is how it sees the circular economy as a butterfly diagram.**
Ghisellini et al. (2016, p. 11)	*By promoting the adoption of closing-the-loop production patterns within an economic system CE aims to increase the efficiency of resource use, with special focus on urban and industrial waste, to achieve a better balance and harmony between economy, environment and society*	**An extensive review on circular economy of the last two decades. It aims on creating a base for the main features, perspectives, similarities and discrepancies of circular economy by examining different levels, such as micro and macro level**
Murray et al. (2017, p. 377)	*The circular economy is an economic model*	**Increasing awareness surrounding business ethics.**

	wherein planning, resourcing, procurement, production and reprocessing are designed and managed, as both process and output, to maximize ecosystem functioning and human well-being	**The environmental pillar of the term 'sustainability' is the least exploited in circular economy literature. Re-evaluates the definition of circular economy, based on issues related to the usefulness of the concept**
Geissdoerfer et al. (2017, p. 759)	*A regenerative system in which resource input and waste, emission, and energy leakage are minimized by slowing, closing, and narrowing material and energy loops. This can be achieved through long-lasting design, maintenance, repair, reuse, remanufacturing, refurbishing, and recycling*	**A review of the pertinent literature on circular economy. Aims to disclose gaps in the literature and differentiate terms in the literature to find similarities and discrepancies**
Velenturf et al. (2019, p. 963)	*A circular economy offers solutions for global sustainability challenges through the transition from the linear take-make-use-dispose economy to a better organisation of resources. […], in our view, resource flows*	**Introduces a new diagram on production-consumption that aims to create a new conceptual space for the development and implementation of effective circular economy technologies, business models, and policy. Therefore, it aims on redefining the theoretical**

	often contain tightly bound combinations of organic and inorganic materials either due to their natural composition or due to their technical design	**boundaries of circular economy**
Nußholz et al. (2019, p. 309)	*Circular business models aim to utilize embedded economic and environmental value in products and materials for as long as possible, for instance through substituting primary materials with secondary materials*	**Examines how business model innovation and policies limit the transition to a sustainable circular economy. Examines, through case studies how business model innovations facilitate strategies and how to mitigate barriers**

Table 1: Literature on circular economy with definitions and key focus of the paper

3.2.1 Sustainable value creation

As mentioned earlier Geissdoerfer (2017), found that circular economy is a condition for sustainability, and can be seen as a trade-off or as a beneficial relation. Furthermore, both circular economy and sustainability often rely on system design and innovations as main drivers for reaching their desired goals, backed by multi or interdisciplinary approaches in order to integrate non-economic aspects into development (Geissdoerfer, 2017). In addition to this, it challenges the traditional view of value, where it does not only include costs and risks but emphasizes differentiation to identify opportunities for value creation. For instance, that cooperation between stakeholders is not only something that is desirable, but crucial in order to reach the desired goals. As a consequence this way of *sustainable value creation* (SVC) could be regarded as a distinct way of distinguishing value.

Moreover, this way of creating value is prone and determined by the business model of the company, which could be changed due to a perception in redesigning of

processes and cycling of materials. As such, it is crucial for businesses to adapt to this new approach to sustainability as a business strategy to engage with the challenges the world is facing (Murray et al. 2017). Furthermore, Murray et al. (2017) brings up the notion of inter-firm clusters but also whole cities/municipalities, in addition to the single enterprise's business model in how to realize a sustainable value creation.

It is important to determine what value the business model creates for the company and its customers, and also for external stakeholders such as society and the environment. In order to create economic viability, an appropriate business model is essential in order to answer questions of how a company can meet circular economy principles and at the same time create value. Something which can be done through new products and innovations, revised value propositions and value chain networks (Bocken et al., 2016; Murray et al., 2017; Nußholz et al., 2020).

Chapter 4: General and complementary literature

As noted in *Chapter 2,* the literature review is divided into two distinct chapters. As such, this chapter will cover a side that is more focused towards sustainability and the concept of creating shared value. Although the sources in this section are of a slightly different art, including a more conceptual and non-academic form, they are still valuable and have been gathered from prominent authors and scholars. Thus, they should not be perceived as inferior sources of information to that of the more academic literature reviewed in *Chapter 3*.

4.1 Sustainability and sustainable development

In an ever-changing world, there has over the recent years been a shift in management and corporations' mindset towards a more sustainable future. In this, the need to act and have businesses that have a sustainable focus is crucial. An important change in many businesses' opinions and actions could be argued to have happened in 1987 when the World Commission on Environment and Development—more famously known as the Brundtland commission—published the report *Our Common Future* (Brundtland Commission, 1987). The report was an initiative led by the UN aimed at solving societal issues related to poverty and

environmental issues. From the report stems a highly valued definition which is frequently used to define sustainable development. In the report the Brundtland commission defines sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." (Brundtland Commission, 1987, p. 32). The paper emphasizes that the people in poverty also have a right to a dignified way of life, but still that there is a maximum capacity in how much resources can be used and utilized and not hinder future access and consumption of these resources.

Furthermore, sustainable development can be divided into three distinct parts and dimensions. Namely, the social, the economic and the environmental dimension (Weinberger et al., 2015). This is more often depicted as people, planet and profit, where we in the intersection of these three dimensions find sustainable development as illustrated in *figure 1*.

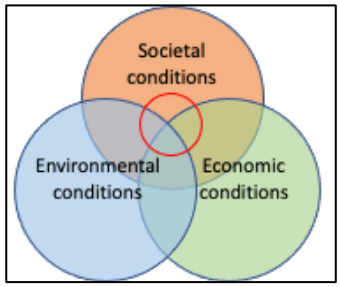

Figure 1: *Sustainable development (Adapted from Weinberger et al., 2015)*

4.1.1 Sustainable development goals

Building on decades worth of work by the UN and member countries, an agenda was set in 2015 to provide a pathway for sustainable development for the world as a whole (Rosa, 2017). The new agenda, called The 2030 Agenda for Sustainable Development was adopted by all member countries in a shared view to reach a certain outcome by 2030. The essence of the new agenda consists of 17 Sustainable Development Goals (hereafter SDGs) and in total 169 targets which build on the importance of action for people, planet and prosperity (Rosa, 2017). The SDGs have now become an integrated part of businesses. The goals have become a guiding compass towards a more sustainable and renewable course for businesses and governments. In Norway over 89% of the companies report on sustainability and social responsibility according to a report from KPMG from 2018, compared to 75% of other companies in a global survey. Norway is regarded as a leading country that goes ahead towards reaching the goals (NHO, 2018).

Furthermore, there are a lot of businesses in Norway that have given their full support towards the goals and integrated this into their business strategy. Over 43% of the international businesses in the survey have their strategy and activities

focused towards the SDGs. In Norway, businesses are used to taking social responsibility, and do not look at this as a threat, but more as an opportunity and competitive advantage. Furthermore, most businesses in Norway want the business outside of Norway to encompass the same responsibility (NHO, 2018). Another reason Norwegian businesses perceive the SDGs positively is due to the due date of reaching the goals by 2030, In order to reach these, the world needs to invest differently than the occurrence that has been. Today's investment toward renewables and sustainable projects need to be multiplied, and over half of this investment must come from the private sector. This investment will enable the creation of jobs, innovation, technologies and sustainable and renewable products to reach the SDGs (NHO, 2018).

More to this, an action plan for sustainable activities was implemented by the EU in 2018, when the prospect of meeting the SDGs appeared grim. In order to achieve the objectives, new incentives were required to facilitate a shift. Despite the fact that this work is a novel concept, the plan seeks to accomplish three major goals: 1) to increase investments in sustainable projects, 2) to facilitate financial risks as a result of climate change, and 3) to achieve sustainable and inclusive growth by promoting greater transparency (European Commission, 2018). Furthermore, there is a criteria in the suggested and approved taxonomy to have *enabling activities*, entailed by activities that contribute to lower emission in other business sectors and value chains (NHO, n.d.) All of these extensive regulations are being implemented in order to reach a sustainable growth and meet the criteria set by the SDGs aforementioned.

4.2 Creating shared value

Creating shared value (hereafter CSV) is a term that was first introduced by Michael Porter and Mark Kramer in Harvard Business Review in 2006. They claimed that this way could be a potential link between corporate social responsibility and the creation of long lasting competitive advantages (Porter & Kramer, 2006).

In a TED presentation, Michael Porter brings up that CSV could be a solution to the great challenges the world is facing. He states that we need to change the

mindset surrounding capitalism (TED, 2013). He explains traditional capitalism as follows: A coal plant earns money by producing energy that is polluting. A higher production yields higher profits, but also emissions. This business model is profiting by *creating* societal issues. However, the business model should focus on *solving* societal issues. Further, these are issues that cannot be solved by NGOs nor governments alone. Since the resources in possession are too small to be scaled, thus making them dependent on private businesses (TED, 2013).

The concept of CSV can be defined as "policies and operating practices that enhance the competitiveness of a company while simultaneously advancing the economic and social conditions in the communities in which it operates" (Porter & Kramer, 2011, p. 6). Furthermore, Porter & Kramer (2011) elaborates that the core of the concept is to focus on identifying and developing the connections between a societal and economical progression. They emphasize that the core business model should concentrate on addressing societal issues, challenges and needs.

To further build on the concept of how to create these shared values, the companies can create economic value by first addressing and creating societal value. By connecting corporations' success with societal improvements, this opens up new opportunities to facilitate new needs, increase efficiency, create differentiation and expand markets (Porter & Kramer, 2011, p. 6).

To differentiate the term, Porter and Kramer (2011) emphasize that CSV is not synonymous to corporate social responsibility, philanthropy or sustainability. It is rather a new way to achieve economic success. They provide three ways of how this can be created:

1. **Reconceiving products and markets**

The largest need that is not being met, is the need that stems from society. By reconceiving products and markets, Porter and Kramer (2011) elaborate that this can solve many of the problems society is facing. An example of this is how many grocery stores have changed their focus from quantity to a greater focus on nutrition. As a consequence, the needs of society are better met by companies as they can be more efficient than what the government can be. Still, there is a presumption that the companies must identify societal needs, utility, advantages and

potential harm which products can make. By utilizing a process like this, companies can meet needs in an emerging market, consequently leading to fundamental innovations (Porter & Kramer, 2011). For instance, microlending is an example of this, which has financially included people which prior to this was a utopia (Porter & Kramer, 2011, p. 8).

2. Redefining productivity in the value chain

A company's value chain is something that is both influencing and is influenced by external factors. Examples of this are natural resources, health and security factors and working conditions. Issues can arise in the value chain which can contribute to extra costs for the company, thus an issue which could be solved by shared value creation arises. Examples of such could be located in a company's energy consumption and logistics where by using new packaging can cut costs and at the same time choose a product that is better for the environment. With logistics in mind, this issue could be solved by how one determines to transport the goods, as well as localization of production plants (Porter & Kramer, 2011, pp. 9-11). Consequently, there is a solution in optimizing the resources to create value both for the company and the environment by changing the activities. This way of creating shared value is focusing on improving internal operations that can improve cost efficiency, resource access, quality and productivity which can be reached through environmental improvements, better resource utilization, investment in employees and suppliers' capabilities (Porter et al., 2012, p. 3)

3. Enabling local cluster development

The productivity and innovation that is occurring in a corporation is subjected to different factors: such as geographical location and homogeneity among companies (Porter & Kramer, 2011). Clusters located in different geographical areas could for instance be educational programs and institutes of businesses. Further, these factors are decisive for productivity, innovation and competition power in a market. By taking a part in clusters and cluster development, corporations can enable the creation of shared value to improve productivity, as well as improve distances or issues located in the framework surrounding the clusters. A company which has achieved this is Nestlé which cooperates and develops localized producers (Porter & Kramer, 2011, pp. 12-14). This way of creating shared value is achieved through the external environment of the company where it improves the environment through investments in society. Further, it enhances local suppliers, institutes and

infrastructure in ways that also increases corporations profitability (Porter et al., 2012, p. 3).

In an article published in Harvard Business Review, Kramer & Pfitzer (2016) emphasize the importance of the ecosystem surrounding shared value creation. The paper assesses the barriers that might exist beyond companies' value chain, and stresses the importance of socioeconomic conditions that might prevent a shared value business model. Furthermore, Kramer & Pfitzer (2016) addresses five elements that must be in place to achieve a large-scale social change: a common agenda, a shared measurement system, mutually reinforcing activities, constant communication and dedicated support (See table 2 for a more extensive description). These are all elements that could seem theoretically simple, but are challenging to implement correctly (Kramer & Pfitzer, 2016).

Elements	Description
1) **A common agenda**	The participants must reach a common agenda that aligns the parties' vision and joint approach to a solution. Furthermore, this agenda must compromise the parties' interests and perspectives, and should develop by using relationship building to assemble key participants.
2) **A shared measurement system**	The participants must align their list of measurement systems that determine how success will be measured and reported. By doing so, it helps create a formalized common agenda and paves the way for continuous adjustments.
3) **Mutually reinforcing activities**	The participants must engage in activities that are mutually reinforcing. As such, it does not require the participants to do the same activities. Instead, the participants should focus on what they are doing best, and this typically involves forming working groups that each address different parts of a problem.

4) **Constant communication**	The participants must build trust and coordination of shared objectives by frequently communicating with one another.
5) **Dedicated support**	The participants should create an environment in which a third actor can assist with a guided vision and strategy, support activities, and a shared measurement practice. These activities can be managed by a single organization or by several, and will serve as a source of information for all parties involved. Furthermore, this needs to be a neutral actor, and as such companies cannot be this support function.

***Table 2**: Five elements that must be addressed (Adapted from Kramer & Pfitzer, 2016)*

The mission driven consulting firm, FSG, founded by Mark Kramer and Michael Porter, has emphasized how shared value and the above-mentioned elements can advance the circular economy (Mahmud, et al., 2017). They also emphasize the barriers in ecosystems that Kramer & Pfizer (2016) assessed, in that they mitigate the scaling of innovative and redesigned products that is seeking to minimize resources utilized and recyclability (Mahmud et al., 2017). In order to meet the growing demand for change and realize business opportunities in a circular economy, companies have started transitioning into a shared value business model. In addition to product innovation, these companies are attacking systematic challenges. In order to achieve meaningful progress, companies need to better explore their external environment and seek relationships for cooperation across supply chains and sectors (Mahmud et al., 2017). Moreover, companies should seek opportunities in their product portfolios and value chains to transform to a resource constrained economy. As such, redesign the value chain. Furthermore, in order to meet the structural barriers, companies need to define their role and develop a collaboration strategy to create a more fruitful pathway to circular economy (Mahmud et al., 2017).

4.2.1 Measuring CSV

In order to measure the value created by a business model focusing on addressing societal needs and challenges, there are numerous factors to examine. Measuring CSV is distinctly different from other measurements, as it should be practical and provide insightful information for improvement and innovation within the business' strategy area (Porter et al., 2012). Yet, it is essential for the business to have processes that are integrated in the core business model of the company—not only a one-time event or periodically happenings that measure something other than results. An integrated shared value strategy and measurement of this include four steps. This feedback loop is one of the central benefits for measuring shared value by providing an overview to understand and unlock further creation of shared value (Porter et al., 2012, p. 4).

The first step is to identify and determine which societal needs you want to address, which necessitates a systematic examination of societal needs and the lack of those that are not being met. This stage should also look at how this relates to the three different approaches of creating shared value. The second step entails putting together a business case. After determining the societal impact that one or more of the three methods of creating shared value can have, the next stage is to develop a credible business case. The business model should be founded on research and analysis of how societal progress affects the company's financial success. Further, the company must track the progression in the next step. This can be done by comparing the development to the desired goals by examining resource utilization and financial results compared to the expected. The final step includes measuring the results and using the new insight to locate new value. In this step the focus is towards validating the link between the expected link between societal results and companies' results to determine whether or not the use of resources through activities created shared value (Porter et al., 2012, p. 4).

4.2.2 Criticism of CSV

Although the concept of CSV has been greeted with an enormous response amongst businesses and scholars, it has also been met with criticism. The criticism could be seen to center around three main areas: first by being an unoriginal concept (Crane et al., 2014). The core areas presented are all closely linked to what you find within

CSR, Stakeholder Management and Social innovation. Aakhus & Bzdak (2012) argue that there is an ambiguity in what is differing CSV from other concepts as there are ambiguities in the definition of CSV. Furthermore, Crane et al., (2014) emphasize that it is difficult to define whether a company is within the concept of CSV, and when it is outside this. As such, this raises implications of whether CSV is a dynamic concept or not.

Furthermore, there has been criticism towards how CSV facilitates the tension between the society and businesses where CSV cannot handle negative consequences from the stakeholders' interests (Crane et al., 2014). This can create problems and issues for the companies that must either choose between the companies best interests or society's best interest (Aakhus & Bzdak, 2012). This insinuates that CSV could be perceived as an utopia, where it is difficult to accomplish both interests simultaneously.

Another question that arises is whether CSV as a business model is something that all companies can pursue. Crane et al., (2014) illustrates issues related to companies that are already societal questionable. For instance, tobacco producers, weapon manufacturers or oil producers. Companies in sectors such as this can create shared value, however the fundamentals within the sector are already inhabiting negative outcomes for society as a whole. As such CSV can enable businesses to earn the *correct profit* and as such contribute to an increased legitimacy in capitalism (Dyllick, 2014; Dyllick & Muff, 2016). On the contrary, CSV can facilitate and help businesses to launder the trade-off issues that arise between economical and societal value creation, and undermine negative outcomes from the companies' actions (Dyllick, 2014). This can potentially lead to companies choosing simple ways of creating win-win situations, but the bigger problems will still be unsolved.

Chapter 5: Criticisms and discussion of literature related to research sub-questions

In the two preceding chapters of our literature review, we have reviewed existing literature on sustainability including development goals, circular economy, activity-based view and creating shared value. We have identified topics that are relevant to our research question:

How have the focal firm's activities and value chain(s) developed and changed in the last years, towards a different business model and value creation, given the circular economy and sustainable approach it has been pursuing?

Based on our review of the literature, we see several changes and challenges related to how a circular economy and sustainable value creation will affect the activities and value chain in the construction industry. In order to provide a more accurate answer to the research question, we need to assess and discuss the aforementioned topics as one. Therefore, we have identified four topics to investigate further and more in-detail. These are the areas that may have an impact on how the value chain and activities in construction organizations have changed in recent years, as well as how they will impact future changes. As a result, for each topic, we have developed one research sub-question.

For an organization to become fully circular, the circular economy as a concept must be at the heart of the organization and actively pursued by the organization and its employees. The literature on circular economy and value chain explanations are flawed in terms of how resources deteriorate over time. In depth, it explains how value creation can be pursued with a circular economy business model (Ellen Macarthur Foundation, 2013a). As a consequence, circular economies can be viewed as a precondition for the long-term development of resources and materials used in organizations. The term "circular economy" can be defined in a variety of ways. However, the primary goal of a circular economy for an organization is to reuse and recycle materials and resources, keeping them within the value chain, as well as redefining market products and services to design waste out of the value chain and minimize negative effects from production (Bygballe et al., 2019; Ghisellini et al., 2016; Murray et al., 2017; Nußholz et al., 2020; Velenturf et al., 2019; Webster, 2017).

Therefore, organizations must construct a regenerative system, which implies that the system itself must be prioritized in order to achieve value creation. In order to create value in a circular economy, organizations must change their activities within the system or value chain in order to gain a regenerative method of extracting even

more from the materials and resources used in the process (Murray et al., 2017; Nußholz et al., 2020; Velenturf et al., 2019). As a result, we see that an ordinary value chain in construction firms and organizations must transition from a linear to a circular value chain. Furthermore, organizations in the construction industry are already beginning to develop and change their activities in order to align with a more circular value chain. As a result, they are departing from the conventional Porter's linear value chain, which is widely theorized today. Based on this information, we formulated the following research sub-question:

What impact will the circular economy have on the activities along the value chain?

As previously stated, the literature on sustainable value creation is somewhat limited, but it paints an important picture of how it differs from normal value creation. It is primarily motivated by defined goals that must be met through collaboration in an ecosystem with its stakeholders. The business model, in particular, is the central aspect through which businesses can adapt and deal with issues that are on the rise.

Even though, sustainable value creation and shared value creation are coined by two different names in the pertinent literature, they assess and emphasize the same areas (Geissdoerfer et al., 2017; Ghisellini et al., 2016; Kramer & Pfitzer, 2016; Murray et al., 2017; Porter & Kramer, 2011). As such, it could be regarded as an equal strain of research and academic terms which seek to distinguish it from more traditional value creation.

Firstly, it is critical to establish specific goals. As Geissdoerfer (2017) and Porter and Kramer (2011) both elaborate on, collaboration of corporations is essential within its operating environment to achieve their objectives. These goals must also be specific, which has seen an emergence since the implementation of UN's SDGs, where companies can set societal and environmental goals relevant to their core business (Rosa, 2017). Furthermore, Kramer and Pfitzer (2016) brings up the notion that in order to successfully implement a business model based on CSV, the

ecosystem is a center piece to create a symbiosis between the activities at a larger scale than just within the business.

Secondly, circular economy aims to create a new framework for value creation related to economic, social and environmental benefits (Velenturf et al., 2019). Similarly, CSV aims on finding the correct solutions which provide value that provide similar benefits (Porter & Kramer, 2011). As an outcome, both lines make the assumption that there must be a monetary value in order to achieve goals (Porter & Kramer, 2011; Geissdoerfer, 2017).

There is an emphasis put towards how the value chain and its activities need a reformation in how it is traditionally perceived. CSV highlights the need of completely redesigning the value chain, with activities that are mutually reinforcing each other (Mahmud et al., 2017; Kramer & Pfitzer, 2016; Porter & Kramer, 2011). Similarly, this reinforcement effect is in the center core of the framework Ellen MacArthur foundation emphasizes (Ellen Macarthur Foundation, 2013a, 2013b, 2014).

This leads to a sub-question, which includes how such a business model can lead to a greater emphasis on circular economy and advance its implementation in a business and industry:

How does a business model focused on sustainable value creation connect to circular economy?

The last years there has been a clear shift in management and corporations' mindset and strategy towards a more sustainable future. This mindset already started to change after the Brundtland Commission (1987), but it is especially the last years that the shift has become even more clear. Climate change is a major problem facing the world, and has been increasingly important in the last years. Governments and businesses are struggling to balance economic growth with negative effects and consequences in the environment (Alwan et al., 2017). Businesses and firms are rapidly changing as a result of ecological and social trends. Especially in the context of shifting the business's corporate responsibility to a more sustainable model.

Consideration of corporate sustainability in business strategies and processes has become an important way for businesses to deal with the rapidly changing world. Many businesses are now considering managing corporate sustainability as a strategy, based on a profit-driven corporate response to environmental and social issues, propelled by the firm's primary and secondary activities. Organizations have already begun to integrate the SDGs into their corporate strategies, and this is now seen as a competitive advantage (Engert et al., 2016).

Further, this is also shown in the report from PWC (2019) where they analyzed over 1100 companies in 31 different countries. Some of the main findings in this report was that over 72% or nearly three quarters of the companies mentioned SDGs in their reporting publications. There is no doubt that the government bears the ultimate responsibility for achieving the sustainable goals, but this cannot be accomplished without the cooperation of various industries and businesses. As a consequence, there is a growing general recognition of the importance and necessity of the goals, but there is still a lack of clear strategies and action from firms. Even so, we can see that the sustainable goals are beginning to have a greater impact on the top of the firms and the main strategies than previously (PWC, 2019). As a result, we can see that the sustainable development goals are beginning to influence the main strategies in the companies; based on this information, we have developed the following research sub-question:

Have sustainability and sustainable development goals in the construction industry affected the change in activities in the value chain?

As noted by the Ellen MacArthur foundation in all three volumes on circular economy Ellen Macarthur Foundation (2013a, 2013b, 2014), there are many barriers and obstacles in transitioning to a circular economy. In example, there could be regulations, technology and cross-industry collaboration that challenges this transition at a large scale, since they are stemming from engrained structures from a linear economy (Ellen Macarthur Foundation, 2013a, 2014). Similarly, Kirchherr et al. (2018) found that cultural barriers appear to be the most prevalent barriers to circular economy, contrary to many studies that normally blame a lack of adequate technology. Furthermore, Kramer and Pfizer (2016) and Mahmud et al.

(2017) emphasized the ecosystem barriers that prevent the scaling of products aimed at minimizing resource input and recyclability. As research on this has become more extensive in recent years, it is interesting to investigate the barriers found in the construction industry in terms of both sustainable aimed business models and circular economy ideas. This leads to the following sub-question:

What are the barriers to implementing circular economy ideas in the value chain in the construction industry?

Chapter 6: Design and methods

6.1 Research design

We conducted a single case study of XYZ Construction Group, this due to the fact that the organization had an interesting portfolio of current operations, a large value chain, and a key player in the construction industry. We saw that this organization is one of the leading contributors to a transition, and as such we wanted to investigate the company further and see how this is done. Furthermore, because this organization has also been a collaborative partner with BI, it appeared to be a viable organization to investigate further.

A case study, which is a research strategy that emphasizes the understanding of the dynamics within single settings can involve either a single or multiple cases, as well as several levels of analysis (Eisenhardt, 1989; Yin, 2003). Our case study has been building on a Gioia approach. This, reasoned in that the Gioia method seeks to discover novel concepts or processes by attempting to capture and model the informants' data (Gioia, 2004; Langley & Abdallah, 2011). These concepts are formulated and defined as "precursors to constructs in making sense of organizational worlds" (Gioia et al., 2013). This method is of particular interest as it aims on finding first order concepts directly from its source in the interviews to analyze the findings to distinguish and locate similarities. This is done so it is possible to separate them into second-order concepts and themes. This is the most pivotal step in the research process since it serves as the foundation for creating a data structure (Gioia et al., 2013).

According to Langley & Abdallah (2011), building on Corley & Gioia (2004), Gioia et al. (2010) and Gioia & Chittipeddi (1991), the Gioia approach suits the research the best when using a single case study and trying to capture the understanding of the informants in such a setting. Furthermore, a single case study was chosen due to its possibility of uncovering new information and data richness (Langley & Abdallah, 2011). We have tried to identify how the different parts of XYZ Construction Group see its value chain to establish similarities and discrepancies. Where a goal was to create first and second order concepts to discover a causal relationship among them. This is done accordingly to both our interview guide, and the utilization of research sub-questions (Gioia et al., 2013).

6.2 Data collection

In order to determine how the value chain of XYZ Construction Group is constructed, and how the business model might impact it, we needed to locate and determine the decision-makers and those responsible for this. Thereafter, analyze this. A thorough discussion was then conducted, specifically on what the unit of analysis could be. Since our research question wanted to examine the aforementioned topics, with circular economy and its impact on the activities and value chain, it created different possibilities for our unit of analysis. We saw that the core topic discussed was the activities and how they change the value chain. For this reason, the unit of analysis was the different activities in the value chain.

The data collection was conducted through semi-structured interviews with employees in XYZ Construction Group. In order to grasp a better understanding of the value chain of the company, we interviewed employees across different divisions and business units, where all informants were highly connected to different projects related to circular economy. A reason for choosing semi-structured interviews is to have the ability to elaborate on certain aspects, and yet ensure that there is a similar basis to go through in all interviews (Straits & Singleton, 2018). Furthermore, the method for data collection is chosen due to a desire to observe the informants speak freely without any interruptions.

When it came to choosing informants, the priority was to interview central decision-makers and the ones with relevant positions regarding what we wished to

investigate. As such, we needed a sufficient number of informants to be ensured a satisfying answer to our research (Pratt, 2009). As this research was initially conducted alongside the WAVA project, we intended on using personal recruitment—utilizing networks in the WAVA project—where snowball sampling was used (Straits & Singleton, 2018). However, there was a limitation to this in regard to time management and available resources from the respondents side—making quality over quantity an important contributor. In addition to using interviews to collect data, we have used additional sources to collect data, such as publicly accessible documents from XYZ Construction Group. Furthermore, internal documents were also important to shed light on factors of importance and enable triangulation of data.

6.2.1 Interviews

In order to access an in-depth understanding of the value chain, value creation and business model our primary source of data was conducted through semi-structured interviews. We recorded all interviews with the consent from the informants and followed accordingly to guidelines and regulations set by the NSD and BI. This made it possible to simplify the coding of the data by transcribing the interviews once they were conducted, which provided a data material as wide as possible (Straits & Singleton, 2018).

Furthermore, the anonymity of the informants has been preserved accordingly to privacy regulations and desires from the informants—including how this information was stored. We aimed to have both of us attending during all interviews in order to prevent subjectivity and bias, but also ensure the data is sufficient and consistent in quality (Straits & Singleton, 2018). Further, as the COVID-19 pandemic was still occurring, all interviews were conducted remotely by utilizing the online platform Zoom, in order to also physically see the informant. Even though, there is a risk related to using phone interviews, this was mitigated with the possibility to have video calls.

6.2.2 Interview guide

The intention of the interview guide was to establish and investigate the statements we chose in order to narrow the scope of the research question down. A reason for

a semi-structured interview is to observe the informants talk freely within the provided topics, and to go in-depth in areas that are lacking. Another reason for this was to establish consistency in the research conducted, consequently that in order to ensure a minimum of reliable data we were obliged to go through similar questions (Johannessen et al., 2016; Straits & Singleton, 2018). At the same time, this allowed us to have widely different interviews and conversations with different informants, while staying within the topics needed in the research. In addition, the importance of having open questions cannot be stressed enough in order to not lead the informant on a certain path (Straits & Singleton, 2018). As such, the questions in the interview guide were formed with the intention of highlighting and investigating our assumptions in *Chapter 5*.

After establishing contact with the informants through snowball sampling, we wanted the informants to choose the given time for the interview. All interviews were conducted using the video platform Zoom, due to restrictions from the COVID-19 pandemic. The reason for letting the informants choose this is reasoned in finding a date that would fit a busy schedule. This could provide a more comfortable and better tone in the interview, as well as the informant could sit comfortably at the chosen location.

A total of five informants were included, all with central positions and roles in the company (See table 3 for information). All interviews lasted for about an hour.

Informants	Responsibility area	Length and type of interview
A	**Director of one of the Environmental Parks**	Over Zoom **1 hour and 20 minutes**
B	**Head of Environment in the group**	Over Zoom **1 hour**
C	**Director/Head of all Environmental Parks in the group**	Over Zoom **1 hour**

D	**EVP for areas including environment in the group**	Over Zoom **1 hour**
E	**CTO of a company closely collaborating with the group**	Over Zoom **1 hour**

***Table 3**: Information regarding informants and length of interviews*

Before the scheduled interviews, we let the informant receive a document describing our intention with the research. This, reasoned in letting the informants prepare on certain aspects for conversation topics. With this document, following regulations and guidelines from NSD and BI, we ensured that the informants understood their privacy rights and what taking part of the project entailed. These are also actions done to establish a level of trust between the informant and researcher, something that is of huge importance when relying on interviews as primary data (Meyer, 2001). In addition, we ensured the informants' acceptance of using voice recording of the interview in order to strengthen our data and findings.

Both the authors, Anders Holberg Hansen and Stian Køhn Berget, attended all the interviews. This, in order to ensure both obtained the same information, which was then discussed extensively after each interview. Furthermore, by recording the interviews, this safeguarded a full concentration on the informants' answers (Meyer, 2001).

In an interview situation it can be demanding to control the topic of the conversation, and at the same time not asking leading questions. Having control of the conversation can be especially challenging since the informants often can be eager to speak and have great knowledge of the topic (Andersen, 1997, 2006). Although it is important to be well-prepared before going into the interview, one tactic a researcher can follow is to act less knowledgeable of the topic than what the real life situation entails. By providing a summary of what the informant has provided in a simple way, it can enable an opportunity to let the informant elaborate more in-detail about the area and provide even richer information (Andersen, 2006; Becker, 1953). We tried to ask open questions, as well as asking for more precision and specifications where this seemed natural in the interview setting.

6.3 Quality of research

6.3.1 Interview as method

The most common way to collect data in qualitative research is through interviews. This might be especially suitable when the investigated topic is not of a private and sensible nature. Furthermore, it is suitable with phenomena that are complex since it enables the informant to go more in-depth and provide answers in more detail (Straits & Singleton, 2018).

However, using interviews as a data collection point have some implications and challenges. Firstly, the researcher itself becomes a part of the setting when conducting the interviews, and as a consequence might affect the interview. Secondly, the researcher's prior knowledge will affect the discussion during the interviews but also the interpretation of answers. Thirdly, the relationship between the informant and the interviewer might also affect the interpretation of the interview, and can lead to subjectivity (Andersen, 2006). By using the same interview guide on all informants with an aim of asking the same questions to the degree it can be deemed natural, it is possible to create comparable data (Straits & Singleton, 2018).

6.3.2 Data analysis

When analyzing the data it is important to have a clear view and understanding of the purpose of the research. The analysis consists of categorizing, examining and combining data to answer the research question. There is no clear strategy nor universal method for analyzing the data to follow when conducting a case study. Therefore, it is crucial to have a thoroughly and detailed approach to what will be analyzed (Yin, 2003). The data analysis occurred concurrently with the data collection. The research question and topic are essential as the foundation of data collection, and this strategy is dependent on them. However, regardless of which strategy is used, the emphasis is on ensuring the highest quality possible (Yin, 2003). In order to secure this Yin (2003) elaborates on four different principles to follow:

1. Construct validity: the analysis must be satisfactory to all findings.

2. Internal validity: the analysis must try to address opposing and differing interpretations.
3. External validity: the analysis must examine the most significant and important aspects of the study.
4. Reliability: the researcher must use its own expertise and knowledge in the study.

Simply put, analysis indicates that the researcher is breaking something down into smaller pieces and elements. The aim of the investigation is to find a message or a purpose in order to find a pattern in the data material. Following that, the researcher can draw conclusions in order to answer the research question (Johannessen et al., 2016).

The data that we analyzed were gathered from the interviews, and thereafter transcribed and categorized using a Gioia approach, so that it could be presented in a text format. When you have a large, comprehensive text material it is critical for the analysis of the data to obtain an overview of this. The analysis of data can serve at least two purposes: 1) it can organize data into themes and topics, 2) analysis and interpretation (Johannessen et al., 2016; Straits & Singleton, 2018). We chose to organize our data comparatively to our sub-questions in *Chapter 5*, in order to simplify discrepancies and similarities between the different respondents.

6.3.3 Reliability

How the data is collected, used and analyzed indicates the accuracy of the data which is considered as the reliability of the data. In simpler terms, this is how the data can be considered trustworthy (Johannessen et al., 2016). By fulfilling desires of reliability, the same research conducted by other researchers should be able to conclude with the same results. In a qualitative research setting reliability is not created the same way as in a quantitative setting, due to how the data collection is structured and more dependent on the context. As a consequence, it is important to describe the methods used in detail so that the reader will understand the process (Straits & Singleton, 2018). Therefore, we have tried to make our method as transparent as possible, and there is no connection between the authors and the company investigated.

6.3.4 Validity and generalizability

Validity can be divided into two different parts: internal validity, which says something about the trustworthiness of the research, and external validity which says something about the transferability of the research (Johannessen et al., 2016). In qualitative research, internal validity is determined by how well the researchers' approaches and findings reflect the study's goal and represent reality (Singleton & Straits, 2018). Transferability is used to determine whether or not the results can be applied to other studies. When attempting to generalize the findings, it is necessary to collect data in a valid manner and to have solid arguments given the empirical setting (Andersen, 1997; Straits & Singleton, 2018).

This is based on the knowledge and experiences of the informants in this study. We have concentrated on primary sources, which are regarded as more reliable than secondary sources. The informants in the study all hold important positions within the company, so it is reasonable to assume they have accurate and reliable information. When using multiple informants, the validity of information provided by one respondent can be checked against what other respondents provide (Glick et al., 1990; Meyer, 2001). Furthermore, this was ensured by triangulating the data and cross-checking it with external and internal company documents. As a result, our arguments and findings were supported by a variety of data sources. The informants' data was recorded and then transcribed shortly after the interviews. Furthermore, this was sent to the informants to confirm the results and to allow them to correct any misinterpreted information.

6.3.5 Objectivity

Objectivity indicates how likely it is for other researchers to confirm the same results in similar studies. The importance of being transparent and open about the methodology must be emphasized once more. By doing so, we ensured that we maintained an objective approach to the study and research (Straits & Singleton, 2018). The data was collected, transcribed, and confirmed by the informants following the interviews were conducted to ensure objectivity (Straits & Singleton, 2018). Furthermore, the fact that the research was conducted by two people can help provide a more neutral approach, mitigating subjective biases.

6.4 Ethical considerations

Ethical considerations are of great importance in business research. There are three central areas in which research ethics focuses on: data collection and analysis, the treatment of human objects and the responsibility to society (Straits & Singleton, 2018). Furthermore, it is important to emphasize how creating a safe and trustworthy environment for the informant is, both during the interview and in the stages after it is conducted (Crow et al., 2006).

To fulfill desires of ethical considerations we follow certain principles in order to avoid harming individuals in the research. To protect the anonymity of the informants, quotation and referencing were done carefully to prevent the informants from being identifiable. Following guidelines, templates and approval from NSD, all informants were informed of the study and what it aimed to seek—as for their reason for the invitation to the study (NSD, n.d.). This consent requires the informants' signature, and is stored adequately to NSD's and BI's regulations on storage of information. Another topic regarding ethical considerations is invasion of privacy. We have worked our best on preventing framing of questions and preventing bias to affect the answers given (Johannessen et al., 2016; Meyer, 2001; Straits & Singleton, 2018). The transcribed data has also been presented to the informants in order to ensure that nothing is misinterpreted, and that the informants acknowledge the data. This level of transparency is also desired as aforementioned, due to the prevention of deception of the research, which would present our research as something it is not.

Chapter 7: Empirical findings and analysis

We will present our analytical results in this chapter and review the interviews and various data samples in order to adequately plan the discussion and conclusion in the two following chapters. The four topics described in section 3.5 will be used as guidance in the study to address the findings on the overall research question:

How have the focal firm's activities and value chain(s) developed and changed in the last years, towards a different business model and value creation, given the circular economy and sustainable approach it has been pursuing?

The interviews, as well as quotes from them will be used to support our observations and analyses, and referenced accordingly to *Table 3: Information regarding informants and length of interviews* located in *Chapter 6.2.2*.

7.1 The impact circular economy has on activities in the value chain

In this first section we are going to relate our findings to the first research sub-question, which was as follows:

What impact will the circular economy have on the activities along the value chain?

Most of the value chain in the construction industry is about completing a project, which includes several different actors. The main goal of XYZ Construction Group is to provide what customers or contractors have requested. As a result, no contracts are the same, which is the essence of a project-based industry. As a result, the company and its employees must always adjust to where and how they operate. As a consequence, one may argue that the activities and value chain will vary from project to project, but this is not the case; the activities and processes are fairly consistent from project to project, and the end result is the same; when the contract is completed, the work is completed. The value chain has always been linear, and value creation from activities is done in the same linear way of thinking as they always have.

However, this is starting to shift, and it is happening faster than expected as clearly stated in all interviews. As mentioned earlier in the thesis, the construction industry is a significant contributor to climate change and is noted for being the '40% industry.' However, as a result of new technologies and innovation, the building industry in Norway has begun to shift in a larger degree than some years back. All of the interviews with XYZ Construction Group and Northern Concrete provide a great example of how a part of the value chain is shifting toward excavation work, unpaved mass, and landfill towards construction of roads and buildings. In XYZ Construction Group's Environmental Parks, they have started to change ordinary landfills and unpaved mass. Today's typical value chain for excavation, mass

handling, and landfill is made up of two different activities and actors with mostly separate value chains.

First, the excavation actors remove various gravel and other mass from the gravel roof in order to meet the various needs of the client. The mass or bulk materials are then loaded onto trucks and transported to the construction site. As a result, when the trucks arrive at the construction site, the value chain for excavation actors comes to an end.

Secondly, after the excavation actors have delivered their goods, the mass handling and landfill actors arrive at the construction site with their empty trucks to load on the various bulk materials that have emerged from the groundwork. They then transport everything from gravel, stone, soil, clay, and polluted mass to the landfill, where the mass will, in the worst-case scenario, trigger emissions of pollutants that are harmful to human health and the environment for decades.

As a result, we get to different activities that mostly happen today without any connections. But why is this the case when bulk material delivered to mass handling and landfill can be used in the same way that excavation actors can? This will allow various actors and activities to collaborate and create a circular value chain. Thus, if we apply this to activities and set it up in the same location, we will get two linear value chains that will merge into a single circular value chain instead. Then, instead of driving empty from or to the construction site, the trucks always take some of the mass that is going to be delivered to the landfill where the recycling and cleaning of the mass takes place, and they can deliver new cleaned mass out to the construction site.

Further, this means that a project can use the mass from their own groundwork at the construction site, and send it to a landfill such as XYZ Construction Group's Environmental Parks. Here, they wash and recycle the mass, sorting out gravel, stones, and taking out all environmentally harmful mass and returning them to the construction site as new, sorted, and recycled mass. This is the definition of what circular economy means in practice. Or explained in the words of informant A:

> Our primary thought with this was to combine the two. Thus, perceiving a landfill as a resource, where the waste is stored since it can be used for something else. At the same time, we saw that the trucks left empty-handed from the landfill, which made us think why does this happen? (Informant A, Personal conversation, 19.03.2021)

He further expressed that "The trucks then brought back rare resources, such as gravel and mass from another excavation source, when the needed resources were initially found in what they had brought in." He then summarized the set thoughts behind it all "By combining the *area* of waste and *area* of resources, then minimize and make cuts in both areas to create one single area in a circular value chain."

Similarly, informant C made importance of how they create a new resource from a change made in the activities:

> When we first started with this, we saw that through our pilot project that the resource that went to landfills which contained pollutants had great properties to be used as something else. However, this had never been attempted and succeeded as this was clearly something complicated. Consequently, I brought this to my employer and asked if we could figure out a way to succeed in this, as it was definitely an untouched market that could yield great margins (Informant C, personal conversation, 23.04.2021)

He went on to describe how the value chain and industry used to look: "Earlier, when a landfill was accepted, you could live a 'happy ever after' life, where you as a landfill had huge returns by putting materials into the ground, with few resources involved. They have practically done nothing." Further he described the potential of implementing a different mindset: "When I got the opportunity to see how this could be changed, I saw that we could be left with even greater margins than those of the construction industry normally are left with, at 5-10%." By the pilot project

conducted, where they had tested polluted mass in a lab. The results of this, showed that by extracting the smallest of particles from polluted mass collected from a bucket, which then could be implemented in other components. “That made me think: why can we not do this same procedure, but on a scale times hundred thousand, and do this on a far larger scale? This was all about developing the technology to do what we are currently conducting today.”

The new technology that was developed, resulted in combining two linear value chains and merged them into one single circular value chain. As a result, this new market posed a challenge to two distinct areas of the industry, each characterized by a distinct set of activities. This has created some resistance from the actors usually responsible for these activities. Informant D noted that:

> When we are talking about the Environmental Parks, we are dividing these into two separate areas: 1) one that constitutes of excavation actors, and 2) one that constitutes of landfill actors. So when we are deriving this into one distinct area, this is not always deemed popular. But we think this is really funny because we create a new twist in which a customer perceives us as both an excavation site and a landfill—where we could be seen as a large washing machine (Informant D, personal conversation, 04.05.2021)

Furthermore, strategic partners and cooperation with other construction industry actors will be critical for advancing the construction industry's circular economy. This could be exemplified by how XYZ Construction Group has collaborated with a leading Norwegian recycling company on a building project in Bispevika (XYZ Construction Group, 2021). The project’s goal was to complete two large housing projects with no residual waste. There were a lot of practical waste sorting solutions in the project, as well as a lot of worker training courses for both employees and subcontractors who worked on the project. The project's high ambition resulted in 97 percent of construction waste being sorted for recycling, which is significantly higher than the regulatory requirement from authorities at 60 percent. Another noteworthy aspect of this project was the use of sea water as an energy source to

heat the buildings. The use of a seawater-based heat pump was also an Enova-supported solution, which supports environmental initiatives that help to make Norway a greener place (Enova, n.d.). Resulting in the reduction of buildings' energy consumption (XYZ Construction Group, 2021). This exemplifies how new solutions and a circular mindset can shift project practices toward new solutions and innovation. As stated earlier in the thesis, building energy consumption is extremely high, necessitating a shift toward a more circular mindset. This also emphasized in the words of informant D:

> The mindset of circularity, with having solutions and measures towards reusing contributes to a reduction in landfilled waste, but also minimizing the consumption of non-renewable resources as well as increasing the energy utilization is what we have put on the agenda (Informant D, personal conversation, 04.05.2021).

Additionally, he made the importance of how the Environmental Parks' success has been a motivator for the group as a whole for this change of mindset. "We are seeking to develop circular products that provide a competitive force and that is also facilitating future recyclability and potentially reuse. This is why we have made the recyclability of materials a priority in the group."

One of XYZ Construction Group's other strategic partners, Northern Concrete, has been a key partner in advancing circular economy in the construction industry. Northern Concrete is a significant producer of concrete. Concrete is one of the products and resources in the construction industry that creates the most CO2 emissions and is harmful to the climate and environment when produced, because of different discharge and sludge as a result of the production. Informant A explained the similarity: "The ones producing concrete very often get requirements to reduce their environmental footprint, because both the cement and concrete world are huge sources of CO2 emissions." The need for bulk material, such as sand and gravel, are essential when producing cement and concrete; these materials come from excavation actors and crushing plants, but they take their resources from

nature, whereas XYZ Construction Group and the Environmental Park uses recycled mass from construction sites and recycled concrete. Further, informant A explained:

> We see that we have a lower environmental footprint and CO2 emissions than the excavation actors, which we have served to large Concrete actors such as Northern Concrete. As a result, we have now signed a letter of intent to deliver mass of concrete and cement (Informant A, personal conversation, 19.03.2021).

Similarly, informant C stated, "The concrete industry has a very bad reputation when it comes to carbon, that it is the industry that emits the most carbon." He went on to say that there is an urgent need for this industry to change its ways and develop green concrete. In this regard, Environmental Parks will provide a greener amplification to the production and inside of the given emission requirement in Norway; ”And this will create added value to the value chain in the concrete production.”

There is no denying that the concrete industry used to have a relatively linear value chain in the past. It was not common practice to recycle waste, slam, and return concrete, there was no thought of reusing the byproduct or waste, as it was known as some years back. This was emphasized by the CTO in Northern Concrete. As a result, there is no doubt that this industry required a shift from a linear to a circular mindset, as well as a shift in the activities and value chain. However, this has already occurred, and the value chain has shifted. Or explained by the CTO in Northern Concrete: “This has completely changed; now there are orderly forms. We now use as much recycled concrete and recycling processes as possible in our production.” Furthermore, the strategic partnership with XYZ Construction Group and the Environmental Parks is a great example of using polluted mass that most likely would have ended up in a landfill. Informant E went on to elaborate on the potential of collaboration with Environmental Parks: “They take in the mass that do not have a clear purpose and transform it into a completely developed product that

we can use 100 percent in our production in the concrete industry, which is brilliant." (Informant E, personal conversation, 04.05.2021).

According to the aforementioned interviews, the importance of strategic partners and collaboration with the various actors along the value chain in the construction industry will be critical to further developing and changing the value chain from a linear to a more circular way of doing things in the construction industry.

As a result, things have begun changing in the construction industry. This type of circular value chain and changes in activities will provide both competitiveness and financial sustainability towards the other actors, particularly in the aforementioned activities in the value chain. This is likely to spread to other parts of the construction industry and other parts of the value chain. Informant E explained this by exemplifying XYZ Construction Group's Environmental Parks, which began to compete with landfill and excavation actors:

> I think it is a real reality check; I think it is like, wow, they are getting paid 2-3 times for one product. They are paid to bring in the waste and then to sell it as a product. Unlike excavation actors who take out some gravel, sell it, and never see it again. And this sharpens them, forcing them to think in new ways (Informant E, personal conversation, 04.05.2021).

This is explained further by informant A: "This makes us a relatively robust and competitive company, since we became a double cash cow. You have one income coming in, and then get an additional income on the finished products." He further explained that they actually get paid to receive a resource that many see as waste, and firmly stated " I think that is pretty cool."

Summarized from all the interviews, they all encompass that circular economy and circular value chains are no longer only buzzwords, but are actually changing and being implemented at a faster pace than before. Informant D summarized this with: "We are completely convinced that circularity increases competitiveness, which is

why we do it; it is wanted and financially sustainable. One should not have any doubts in this, as it has already been proven."

Based on our findings, there is little doubt that the circular economy is kicking off the transition from the traditional linear value chain that the construction industry is known for to a circular value chain for many of the activities. Furthermore, we discovered from our findings that strategic partnerships among the various actors in the construction industry value chain are critical in order to achieve a completely sustainable and circular economy in the construction industry.

7.2 How a business model focused on sustainable value creation connects to circular economy

In this second section, we are moving on to our second research sub-question and findings related to this. The question was as follows:

How does a business model focused on sustainable value creation connect to circular economy?

As part of a new strategic plan for XYZ Construction Group, they have worked towards implementing sustainability into its core. Informant D emphasized that this has not been an easy process and there is still a long way to go:

> We have been good at 'cleaning up in our own house,' but we might have been a bit too bad at thinking from an outside-in perspective. We have attempted to mold this strategy and communicate this accordingly to the SDGs (Informant D, personal conversation, 04.05.2021).

He went on to further elaborate on how the framing of a strategic plan and business model can impact circular economy:

> We have two goals with our strategy: 1) reduce climate emissions by 50% by 2030 and 2) reduce our waste residuals by 50%, but not residuals in

> general. As the latter one could kill the circular mindset, so we are aiming at reducing waste that cannot be reused and recycled.

Moreover, informant A focused on the importance of how you need to connect circular economy to your business model, and that it should be a centerpiece like they are aiming at now. “It has certainly become more thorough now, now that sustainability is included in the business model. However, it is crucial to make this circular bit implemented into an economic perspective as well.” With this, he further explained that this is what he believes they are currently doing, with their current technology. As such, he stated that: “There are no opposing forces between economic viability and circular solutions; rather, they can and will coexist.”

Informant B expressed that there are huge possibilities within connecting the core business model to circular economy, but that they only now see its birth:

> This is now a quality target we are aiming for, but there is no overarching plan, yet. Although, it is being worked on, and I believe we can exploit synergies found within the group today. And when we can connect what we are doing with other actors as well, I think this will be even better and open up even more opportunities (Informant B, personal conversation, 08.04.2021).

In the annual report it is stated that the strategy aims on creating value for 1) the coworkers, 2) the customers, 3) the owners and 4) the society. By the latter one, it says that they aim on running a socially responsible business by having a sustainable business model. By having this, they want to add value to the society through the offering of services that help solving societal issues. In this, they also emphasize how the business model can help solve environmental issues as well (XYZ Construction Group, 2021).

As stated several times from the interview, even though they are focused on circular economy, it is not enough to go it alone to disrupt the industry:

> It is a necessity to cooperate across sectors and industries. Thinking about circular solutions, you can often find synergies in clusters and networks. Exemplified by a study in Great Britain where both an actor in the construction industry and an actor within fish farming produced soil from two different business sectors (Informant B, personal conversation, 08.04.2021).

Informant C also emphasized how the seed that they have put with their strategic plan moving forward, can be rewarding in terms of advancing the circular economy focus in the company: "Since climate and environment is one out of four focus areas in the new strategic plan, this shows the belief in advancing what is already a business area that has come quite far." With this, he elaborated on how far they have gotten with the commercialization that started in 2014 with a business area solely focused on circular solutions. After this, that area has always delivered positive results and returns every single year. "A certain degree of early profitability has been important, but I think this is not always correct as some projects/innovations should have gotten a better chance." With this he stated a small concern, even though they have this circular bit intertwined in a business model focused on creating sustainable value, regarding that the industry could be perceived as impatient. "In some months, when things are going good, there is a huge euphoria towards solutions like this, however when we have one bad month all these ideas are disregarded and it is back to the basics again." Informant C further stated how quickly the internal focus can change from month to month, even though it is seen, on paper, as a major focus area for the company.

7.3 How sustainability and the SDGs have affected the change in activities in the value chain

In this third section, we are moving on to our third research sub-question and findings surrounding this, which was as follows:

Have sustainability and sustainable development goals in the construction industry affected the change in activities in the value chain?

As mentioned before, the implementation of the UN's SDGs has contributed to a different mindset among businesses worldwide. This has not been passing unnoticed in the construction industry either, as emphasized by informant B in XYZ Construction Group who emphasized that the industry has been in a total change, considerably during the last years. Furthermore, she stated that "An example of how the industry has changed the last year can be exemplified by how the corporation started with carbon accounting in the early 2010's as well as a focus on climate certified buildings." Furthermore, informant D noted that "The SDG's are our time's ultimate guidelines if you are unsure on what to do and not to do." Informant D further proclaimed that their intention is not to fulfill all goals and desires, but rather focus on the goals relevant to the business and sector, and how they can contribute with their operations to reach those.

Additionally, in a new strategic plan for the coming years this is engraved as one of four core initiatives, emphasizing a profitable, innovation-driven and environmentally friendly journey moving forward (XYZ Construction Group, 2021). XYZ Construction Group has incorporated a total of nine of the SDG's, all with different measures for its contribution to reaching the goals (See *Table 3* for the most relevant SDGs the focal company is pursuing). As such, it is an important part of its corporate social responsibility that has its implementation in the group as a whole (XYZ Construction Group, 2021). Following the UN's taxonomy on sustainable activities, the overarching goal is to minimize residual waste, by the implementation of a 'waste hierarchy' (XYZ Construction Group, 2021).

SDG	Relevance for the company	Focal company's aim to reach it
Goal number 9 **Industry, Innovation & Infrastructure** *And* Goal number 11 **Sustainable Cities & Communities**	One of the group's core values is encompassing an entrepreneurial spirit. Through their competence on environmental solutions that meet both today's and tomorrow's standards.	**The group has developed a unique technology to clean and reuse polluted mass. Furthermore, there is a continuous development of energy efficient services and environmentally friendly buildings.**
Goal number 12 **Responsible Consumption & Production**	Through a focus on the environment, climate and reuse they plan on removing materials, and solutions that are damaging for the environment.	**The group is continuously developing its services. Life cycle analysis and tracing recyclability are measurements in all projects. The focus on these numbers is advocating increased environmental responsibility in the group as a whole.**
Goal number 13 **Climate Action**	The group has a focus to limit and mitigate its impact on its surroundings. All the divisions and units each have their own targets to reduce the impact on the environment. As well as how they all must follow the environmental standard ISO 14001.	**It is determined centrally in the group that all projects must have a risk analysis prior to the beginning. Environmental risk is a large part of this assessment.**

Table 4: *The focal company's position to relevant SDGs*

In addition, sustainability has skewed the focus towards becoming a leading actor in creating socially benefiting possibilities, as expressed by informant D. This is also a result of a proactive part, where the company no longer seeks to only act reactively to changes in the environment, but to conduct proactive initiatives. Exemplified by an eagerness to attract talented individuals in environment and climate related fields, in order to 1) increase knowledge in waste production and carbon footprint, 2) contribute to protecting and increase biodiversity, and 3) limit use of toxic input by choosing and developing substitutes of higher environmental quality. As such, the corporation seeks to understand the environment and climate issues as a business opportunity. Where the sustainability challenges pose as both a threat and an opportunity for the corporation. By having well-developed environmental solutions this can attract talent, stakeholders and make way for new projects (XYZ Construction Group, 2021; Informant C; Informant D). On the other hand, by only seeking a reactive response this might deter the competitive position of the firm (XYZ Construction Group, 2021). Informant D underlined how "by not acting proactive, you will over time lose more and more of your competitive force, since you are no longer perceived as an attractive employer and this might result in losing certain qualifications by having a cost-inefficient business."

One way the construction industry has been impacted by the emergence of a sustainability mindset could also be seen through BREEAM (BREEAM, n.d.). This is a climate certification which assesses the climate -and environmental friendliness of a building in both construction and use (XYZ Construction Group, 2021). The importance of this new way of certifying buildings is greatly emphasized by informant B: "By having a certification and its fulfillment in previous projects, this has opened up a new way of landing projects with new construction sites. We can show how we have obtained great competence in this area." Furthermore, she elaborated on the shift they have seen in recent years: "Because of BREEAM, we see that more and more actors are starting to focus on life cycle analysis, and costs seen throughout the lifetime."

The change and emergence of new markets, could also be seen as a result of the shift brought by ever growing environmental issues. Previously, after the excavation of mass in Trondheim, this was then shipped along the coast ending in

a landfill near the Oslofjord. “Even though there were discussions driven by sustainability at that time, this was still occurring until some smart people demanded that this needed to change” said informant A.

> Back then, and this is still occurring somewhat, it was a perception that if you only wanted ‘green’ solutions you would get some weird stares due to what you just said. And this is still a mindset out there, where there is a strong belief that these solutions are much more expensive than the traditional ones. When in reality it could often be the opposite (Informant A, personal conversation, 19.03.2021).

This emergence of seeing problems with a different lens, was one of the contributors to the initial plans for constructing the Environmental Parks, and changing how rigid activities could change with the introduction of new technology, was noted by informant C.

However, even though there is a clear shift regarding how to perceive and seek more environmentally friendly solutions in order to improve the value chain’s carbon footprint, informant D stated some concerns with a solely focus on this:

> We believe in sharing our current technology, and since we have put a lot of human capital into this we are not afraid of losing our foothold. However, we are concerned with the emergence of ‘Donald Duck’ solutions, that are not well-developed solutions but persuade others to believe in this (Informant D, personal conversation, 04.05.2021)

This concern was expressed towards how the authorities might approve solutions that are not something that will solve anything, and that this can become the benchmark, potentially creating uncertainties and distrusts toward innovations in the industry.

7.4 Barriers to implementing circular economy ideas in the value chain

At last, this section will provide the findings related to our fourth research sub-question was as follows:

What are the barriers to implementing circular economy ideas in the value chain in the construction industry?

As stated previously in the thesis, shifting from a linear to a circular value chain way of thinking will inevitably generate some resistance and barriers towards the change. When it comes to implementing a circular process into the construction industry, there are clearly some barriers that the construction industry must overcome in order to further develop a circular value chain throughout the activities in the entire value chain and not just some parts of it.

To begin, all of the interviews show that the barriers to regulations, typically industry standards, taxes, and fees need to change to make it easier for the various actors to work toward more sustainable and circular solutions. And government regulations must keep up with the changes that are taking place. "The state governing bodies, they are definitely the first and most difficult barrier to break and overcome, because it is them that give the opportunities," said informant C.

The importance of the governing bodies to further change the industry is essential. Another good example is the use of different standards, which needs to change in order for the industry to use more circular solutions, such as recycled materials. In Norway, this is known as Standardverket, and it is where they change and set the standards that the industry must follow (Norsk Standard, 2021). The CTO in Northern Concrete emphasizes this further: "All of those who work within Standardverket need to have clear and distinct image in their heads toward how the standard can be applied for increased use of old fun and recycled mass in production of concrete." Statens Vegvesen is another example of a governing body that needs to change their standards and guidelines. The EVP in XYZ Construction Group came up with a good example of how Statens Vegvesen can change:

> Statens Vegvesen is in charge of road construction regulations, so they have regular contact with the excavation actors. In some ways, they have chosen a Rolls-Royce approach to things. We can say that we need high-quality mass for highway construction and maintenance, but they could be a little more innovative in the construction of walking and cycling paths that do not carry the same load as a highway, so there will be no revolution in the construction industry until regulations are revised." (Informant D, personal conversation, 04.05.2021).

There is little doubt that the government and governing actors will need to exert more influence in order to further develop a more circular and sustainable construction industry. All of the informants clearly state that the government needs to change the regulatory side of things faster than what is currently happening, as it takes far too long to get approvals and get input on proposals from the industry. This was clarified by informant C:

> You see, when the government comes in and changes things, that is when things really start to happen, because they lay the guidelines and conditions for purchases and work. Things will then change overnight, as the first big contracts set the principles, and the market will change and adapt quickly because money is what prevails in the end (Informant C, personal conversation, 23.04.2021).

Secondly, the barriers to collaboration between actors were clearly revealed in the interviews. The various entrepreneurs, contractors, and producers in the construction industry must collaborate to find the best way to transition to a more sustainable and circular way of thinking. Informant D explained that the biggest players in the industry may bear the most responsibility, but in many cases, this is just an excuse from many entrepreneurs and producers, who say that if the

contractor asks then we will do it. Contractors, on the other hand, say that if the entrepreneur and producer offer us good solutions, we will use them. Further, he said: “Then, all of a sudden, we sit on each of our mountain top, therefore, the need for cooperation, interaction and new contract modules are needed to succeed.” There is no doubt the actors must work together for the industry to be fully integrated with a circular mindset.

Another good example from the interviews towards how this mindset and cooperation is lacking, was explained by informant A. He described how a different business unit of XYZ Construction Group tried to get one municipality to change mindset towards a more circular one. There, he was sent between different instances, and one after another referred to another department or company that he needed to ask. The conclusion of the story was that it was an example of circularity, as he ended up where he first had begun his inquiries, and emphasized how rigid and difficult it can be as no-one takes responsibility for actions. Further, this was to exemplify how the cooperation between the actors is non-existent as all actors are too afraid to make mistakes.

Finally, the informants emphasized that the construction industry's culture and attitude, as well as the fact that the construction industry is particularly conservative, is a barrier to overcome. There is no doubt that this is an industry that has been doing the same thing for many years, with no real innovation that has completely changed the industry. But this is starting to change at a much faster pace than before. The Environmental Parks are a good example of innovation that actually have changed the entire industry to have a more sustainable and circular mindset. Although the barriers are still challenging to overcome, CTO in Northern Concrete explained this as: “it is too much ‘eeeh-attitude,’ it is okay to be skeptical and take it nicely, but now is the time for this industry to roll up their sleeves and do the necessary innovation to get this done.”

Furthermore, there is not just a challenge in the overall industry, but also internally in XYZ Construction Group. Where there are still some cultural barriers ingrained in the attitude towards circular solutions like the Environmental Parks. Both informant A and C said this in a very good way: “What is special is that you never

become a prophet in your own country, as some claim, and this is demonstrated in XYZ Construction Group as well." Informant C then went on to explain that they think it is strange that they do not manage to convince the other divisions in their own company, which leads to the abovementioned business unit having to go to competitors who are interested in trying this out. Because they can see that they are making money at the bottom line by doing so. All of the informants emphasized that the construction industry is conservative, that certain opinions are held in high regard, and that security is of the utmost importance. It is the set culture and fixed mindset on how to do things, as well as skepticism about trying new things.

However, this is starting to change. There are a lot of different processes and documents that need to change for the industry to actually accept new and better ways of making the industry more sustainable and circular. Informant A described this:

> It is a process of maturation. Then there's the fact that it's a conservative industry, so you'll need to prove that your products are good. And has the same or better properties than virgin products. And it doesn't really matter if some of the stones are gray and some are a little reddish. Because the composition and mechanical effect, rather than the look, have a say here (Informant A, personal conversation, 19.03.2021).

Consequently, the attitude throughout the value chain needs to change. Informant D said that the attitude is maybe the biggest barrier the industry needs to overcome: "There is still a lack of daring in the industry." Further, he explained that everything about this is about the attitude and mindset, there are always easy to come up with some excuse for not doing new innovation and new ways of doing things. " I believe it is mental rather than physical. As a consequence, we are the greatest barrier." The construction industry is not known for being the most innovative business, and there are still many conservative and rigid mindsets, that do not think the same way as younger generations. According to the informants, they believe that the new generation that have begun working in XYZ Construction Group and the

construction industry now, has a completely different mindset toward innovation, circular economy and sustainability. Informant D summarized how the industry is going to overcome the attitude and mindset towards the change that is needed:

> Covid has been a crisis, and you could say that climate is a crisis, but we cannot see it or feel it in our bodies. This is not a sprint; it is a marathon, and there are other factors that force you to adapt. Then the sustainability goals are a good thing, and you can supplement this with taxes (Informant D, personal conversation, 04.05.2021).

He went on to say that getting the best people is the most important way to change this mindset and attitude, and that the new generation of students has a completely different mindset. Today, when a new student arrives for an interview, they have clear thoughts about sustainability, circular economy, and innovation, and they specifically inquire about what XYZ Construction Group is doing to overcome these challenges. When these talented people start asking different questions and come up with different answers, the culture, attitude and mindset will change in the organization. Informant D summarized this: "The important thing to remember here is that the most appealing workplace wins because it attracts the smartest people."

Chapter 8: Discussion

In this chapter, we will discuss our empirical findings and draw parallels between them and the literature reviewed in *Chapter 3* and *Chapter 4*. We will use our four research sub-questions to guide our discussion. This is done in order to examine the relationship found between the company and the pertinent literature. Following that, a partial conclusion will be provided after each research sub-question in order to answer our research question:

How have the focal firm's activities and value chain(s) developed and changed in the last years, towards a different business model and value creation, given the circular economy and sustainable approach it has been pursuing?

8.1 The impact circular economy has on activities in the value chain

In this first section, we will discuss our findings related to our first research sub-question which was as follows:

What impact will the circular economy have on the activities along the value chain?

In comparison to the term sustainability, circular economy is a relatively new concept. The Ellen Macarthur Foundation has published several reports, the first of which emphasized how a linear economy is limited, the second of which emphasized how value creation can be pursued with a circular economy business model, and the third different types of input resources produce different results in manufacturing processes (Ellen Macarthur Foundation, 2013a, 2013b, 2014). From this, circular economy is viewed as the solution for the construction industry's problem of moving away from being defined as the '40% industry.' Our reasoning behind this is based on the research by Bygballe et al. (2019), Nußholz et al. (2019) and (2020), and their arguments about circular solutions that can change the industry. There was no doubt, based on the interviews, that the circular mindset was critical in XYZ Construction Group's transition to a more sustainable future in the organization, but also in the construction industry as whole. Throughout the interviews, it was emphasized the importance of the entire industry changing to more circular solutions, because without some of the core activities in the value chain not changing, it will be more difficult for the other peripheral activities to change as well.

When we think of the circular economy, we often think of it as an umbrella term for innovation towards the best utilization of resources in the value chain, how to reduce waste from production, and how to use recycled materials and resources. Therefore, drawing on Murray et al. (2017) and Velenturf et al. (2019) we can see that processes in reusing, recycling, and regenerative systems will be critical in the creation of value in a circular economy. In other words, the activities in the value chain must shift from a linear to a circular mode of operation. This was also emphasized in our findings, but as of today, the change had only occurred in some parts of the value chain. However, they have started realizing that the industry has

no choice but to change, and that if a firm or organization does not keep up with the changes toward a more circular mindset, they will fall behind. Furthermore, we can see that the entire value chain in XYZ Construction Group has begun to be more circular compared to previous years, as indicated by changes in its strategy. As well as activities structured toward new solutions, such as better energy use in buildings, decontamination and demolition, and the Environmental Parks (XYZ Construction Group, 2021). The example of mass handling in the Environmental Parks from the informants may be the strongest indication of a shift from a linear to a circular value chain. Environmental Parks, such as these, completely transform the value chain in the construction industry specifically for mass handling and excavation, from a linear to a circular value chain.

As a result, the activities in the industry have shifted to a different method of creating value. This is in line with what Velenturf et al. (2019) tries to explain with the production-consumption system. We can also see that the mindset toward mass handling in Environmental Parks can be used in making mass and bulk materials towards concrete and tarmac to build highways, and walking and cycling paths. Although, from the interviews, it showed that there are still some challenges towards regulations, but also towards the mindset of different entrepreneurs and contractors. We can also argue that what XYZ Construction Group is doing in the Environmental Parks is a pretty accurate description of what a circular economy actually entails. These findings are also in line with other research, such as Bygballe et al. (2019), Nußholz et al. (2019) and (2020).

Furthermore, following Nußholz et al. (2020) arguments that new business models and circular value chains must gain competitive products that meet regulatory standards and provide long-term value to the firm and economy, and this will be critical for the construction industry to overcome its linear approach. The bottom line and monetary value will always be the deciding factors in determining which of the solutions is the best in the end. The importance of return on investments and having competitive products is also emphasized by the informants, but they are already beginning to see that the Environmental Parks have provided a competitive advantage over landfill and excavation actors. For instance, the bulk material brought into the Environmental Parks, yields a return two to three times for one

single product. They are paid to collect waste, but also to sell it as a clean product. This is in contrast to the excavation actors, who remove some gravel or other mass to never see them again. Following this, the circular value chain XYZ Construction Group has established in its Environmental Parks has already begun to outcompete other actors in some product areas. However, there are still some issues regarding regulations and mindset that are needed to gain even more from this type of a circular value chain.

As a result of the above, we can see that activities and the value chain are rapidly changing, but also that new activities are emerging because of the change provided by a circular mindset. These new activities will be critical for the competitive advantages they will provide compared to competitors. This reasoned in argumentation by Porter (1996) and Richardson (1972) that the activities will provide the organization with a competitive advantage, if they are performed better, faster, or with fewer inputs than competitors. Furthermore, the activities are what the firm can use to create and develop new innovation and new products, as well as day-to-day operations. With the correct activities, and if XYZ Construction Group performs these activities better or differently than competitors, they will be able to get the most out of these resources (Porter, 1996; Richardson, 1972).

What Porter (1996) and Richardson (1972) elaborates on regarding the activities is consistent with our findings. In some ways, this is exactly what XYZ Construction Group is doing in their Environmental Parks. They have taken different value chains with different activities and combined them into a single circular value chain, where the activities have changed and are performed better than competitors. XYZ Construction Group has also improved the fit, or complementary nature of the activities, compared to its competitors. This is also consistent with what Porter (1996) and Richardson (1972) emphasize with the importance of complementary activities for long-term sustainability and competitive advantage. As a result of our findings, we can conclude that the products that Environmental Parks offer to customers are more competitive than that of other actors who only perform landfill or excavation activities, both of which serve an end product at the end of a linear value chain.

A well-known way of analyzing a company's activities and the value creation they create, is through Porter's (1985) value chain framework, mentioned in *Chapter 3.1.1*. The value chain model's main purpose is to show that activities are the building blocks in the value chain which in turn provide value creation for the firm. However, there is some criticism towards the value chain, particularly from a resource-based view that focuses on a different way of value creation analysis. This view states that the resources need to have certain characteristics, where they have to be rare, valuable and difficult to substitute for a firm to be competitive (Barney, 1991; Wernerfelt, 1984). The circular mindset, as we see it, will change the way we look at resources today. A good example is if XYZ Construction Group is building and developing a new city section, which will require a massive amount of groundwork. This groundwork will in turn produce a slew of mass and polluted materials. Previously, these materials were considered waste, but now they can be used as a resource in the same construction site as bulk material, such as gravel or in the production of concrete.

Consequently, we can see that excavation actors who had rare and valuable resources specifically for construction, are no longer required. The reason for this is that XYZ Construction Group has shifted and renewed its activities toward a circular mindset in dealing with the mass. Then, because of the circular value chain created, a resource that was previously considered waste has become a rare and valuable resource in the circular value chain model.

Without a doubt, resources are important, but in order for the construction industry to progress toward a circular economy and a circular value chain, it will be critical to understand how activities complement one another in order to get the most out of resources. As well as using the same resources multiple times for the same purpose through recycling and a circular mindset. This in turn, reduces the need to acquire new resources, such as new mass from excavation actors. However, in Stabell & Fjeldstad (1998) study, they attempt to expand on Porter's activity-based view and value chain and how it sees value creation (Porter, 1985, 1998). They discovered that applying the value chain framework to many organizations was difficult. The framework is well suited for traditional linear production firms, but does not fit for service and consulting firms, for example. Hence, they suggest two

new and additional models: the value shop and the value (Stabell & Fjeldstad, 1998).

As a result of our findings, we believe that the circular economy will have a constructive impact on the value chain framework provided by Porter (1985, 1996, 1998) on ordinary production companies. Furthermore, building on the work of Stabell and Fjeldstad (1998), that considers activities as the most important source of value creation in a firm, but with some modification to the value chain framework, makes it adaptable. As such, it will enable the value chain framework to be more adaptable to analyses of value creation in firms, thus making the activity-based view more adjustable to current change and innovation.

For many years, the construction industry has been a typically linear value chain. They construct apartments and roads, and when they are finished, they deliver their product through their activities in a linear value chain. But what is happening now is that the value chain in the construction industry is about to change significantly; based on our findings, XYZ Construction Group and the industry as a whole are looking toward a more circular way of doing things. We can also see that various actors have begun to collaborate in order to find optimal circular solutions for various activities. A good example from our findings is the strategic collaboration between Northern Concrete and XYZ Construction Group, and their Environmental Parks, in which these actors attempt to make concrete with recycled mass from polluted materials, as well as reusing concrete from demolished buildings. XYZ Construction Group and their Environmental Parks deliver the mass, while Northern Concrete has the technology in the production of concrete. This is also consistent with the activity-based view, which holds that activities are the basic units of competitive advantage and that activities must be complementary in order to achieve the best results (Porter, 1996; Richardson, 1972).

Furthermore, we see that the collaboration between actors will provide complementarity between activities, since they can connect different strengths together. This will create sustainable value for both actors, since both will gain competitive advantages relatively to their competitors. This is also in line with what Geissdoerfer et al. (2017) and Murray et al. (2017) emphasize, where they claim it

is critical that actors collaborate and implement new approaches to sustainability as a strategy to address the challenges the world is facing. Following this, the use of new innovations toward a circular economy and sustainability is essential in achieving set goals, but also for creating value for organizations. As a consequence, we see that Porter's value chain framework may be more difficult to apply in today's construction firms, since collaboration between actors has changed, and so has the industry's circular mindset toward the value chain. This tendency is also seen in newer research (Bygballe et al., 2019; Murray et al., 2017; Nußholz et al., 2020, 2020; Velenturf et al., 2019).

The change and innovation that occurs in the activities is what allows for better utilization of the resources put into the value chain. In Velenturf et al. (2019) study, they attempt to create a new model on how resources and materials flow through the activities in the value chain, as a result of a shift from a linear to a circular value chain. The production-consumption system they introduce, demonstrates how we can achieve a circular value chain and how this affects the resources and materials used. From our findings we see that the value chain in the Environmental Parks and XYZ Construction Group are harmonizing better with the new circular way of looking at the value chain through Velenturf et al. (2019) production-consumption system. However, we see that this model is more concerned with answering how circular economy can be used, rather than explaining how the activities are essential for creating value in an organization and the importance of complementarity between activities, as Porter's value chain explains.

There is little uncertainty that the activities will be critical for the shift toward a new circular mindset and circular value chains, because it is in the activities that new technology and innovation are further developed. When activities change, this will naturally affect how the value chain is configured, as well as how we look at value creation in the organization. From our findings we see that XYZ Construction Group's activities have shifted from a linear to a circular mode of operation. The defining example is the Environmental Parks. However, other parts of XYZ Construction Group contribute to a more circular value chain as well, such as better utilization of energy consumption in new buildings and projects, and the development of a clean and recyclable construction site with various partners such

as Norsk Gjenvinning and toward demolition and recycling of buildings, infrastructure and oil platforms (XYZ Construction Group, 2021).

A hybrid between Porter's (1985, 1998) value chain framework and Velenturf et al. (2019) production-consumption system will transform the model from a linear to a circular value chain model. According to our findings, due to the rapid transition to a circular economy, ordinary linear value chain industries, such as the construction industry, are now changing. This necessitates the potential need to change the linear value chain framework to be more adaptable to new circular value chains, such as Stabell and Fjeldstad (1998) examined in their paper. Furthermore, a hybrid will make it easier to see how the circular economy affects the value chain, as well as how activities shift toward new technology and innovation in the direction of a circular economy and the value creation in such a value chain. In addition, it will also entail strategic partners as a necessary part of the complementarity between activities and the value chain. Essentially, what Porter (1996) and Richardson (1972) focus on regarding the activities in a firm is still the most important part of the value creation in the value chain. However, the framework is bound to change to meet the rapidly changing conditions towards a sustainable and circular economy, and new ways of cooperation strategies between the actors in the industry.

To conclude, the circular economy which the both construction industry and XYZ Construction Group seeks to create, is already having a massive impact on the value chain and activities in the firms. The industry has begun to transition from a very clear linear value chain to a circular value chain across all activities. The reason for the rapid change is, first and foremost, the emergence of new innovation and technology, such as Environmental Parks in XYZ Construction Group. Second, new methods of strategic collaboration among industry actors are being developed. Finally, the construction industry has a responsibility to help the world achieve the SDGs, especially since this industry is known for being the ‘40% industry’ and there are huge possibilities for improvement.

8.2 How a business model focused on sustainable value creation connects to circular economy

In the second section, we will discuss our findings related to our second research sub-question which was:

How does a business model focused on sustainable value creation connect to circular economy?

Based on the empirical evidence we find that XYZ Construction Group has a strong focus towards sustainability, but also circular economy in its core business model. Especially, considering that this is one of the key areas in the new strategic plan moving forward.

The initial work done by Porter and Kramer in 2011, laid a foundation for what could today also be seen as sustainable value creation, put simply where the business model focuses on solving societal and environmental issues the world is facing. Although, it was a novelty when it was published, this has been increasingly important with the defined goals created by the SDGs as assessed briefly in *Chapter 4.1.* Yet, with the emergence of circular economy-related literature in the years later, this also emphasized some of the core ideas of Porter and Kramer. Especially considering the work done by Ellen Macarthur Foundation, in how it showed the flaws of the current linear economy, and how this could redefine capitalism as we know it today (Ellen Macarthur Foundation, 2013a, 2013b, 2014; Porter & Kramer, 2011). Specifically, the idea that circular economies can be perceived as a condition for sustainable development is aligned with how Porter and Kramer (2011) see how creating shared value can only be achieved through sustainable development.

However, the literature on circular economy is more in-detail on the more specific solutions for achieving value creation, such as Murray et. al (2017) which emphasizes that it is the system in itself that must be in focus rather than merely improving resource utilization. However, there are similarities with how Porter and Kramer (2011) assesses that in order to create shared valued, thus sustainable value, this could be done by both redefining productivity in the value chain which is more towards optimizing the resources, and by reconceiving products and markets which is more encompassed by how well a product meet the government needs. The latter

one could be seen more in comparison with a new regenerative system that minimizes input resources defined by Geissdoerfer (2017).

From the literature on circular economy, how sustainable value is created is of huge importance and in reaching this, the business model is a centerpiece. The way in achieving this sustainable value creation (Geissdoerfer, 2017), is determined by the business model and its integration in the company (Murray et al. 2017). Similarly, this is the whole idea which Porter and Kramer (2011) proposes. In this, cooperation and inter-firm clusters are needed to unleash new value as emphasized by Porter and Kramer (2011) in how to achieve CSV.

In XYZ Construction Group, the business model has drastically changed in recent years. As noted in the findings, they have now implemented how to create value for 1) coworkers, 2) customers, 3) the owners and 4) the society. Especially, considering the fourth point, the emphasis towards creating societal value is ingrained into the business model, accordingly to how Porter and Kramer (2011) emphasize how a business must, instead of only seeking profit maximization, create value for the society and ecosystem it is in. Furthermore, informant B clearly stated this is not something you can go alone, but need to have an adequate network and cluster to which it is possible to develop and proceed with new innovations and technology. As such, this is how the strategy in creating value for the abovementioned group is trying to be met. This also shows the contours of how the company is trying to measure the created value, something that is an ambiguous and difficult way in having a measurement system, according to Porter et. al (2012).

One of the largest criticisms towards CSV is how this can enable businesses to only solve the minor problems, but leave the bigger and more environmental impacted issues unattended (Dyllick, 2014; Crane et. al, 2014). This is also something that the informants brought up as an issue, where it was stated that there are issues regarding a ‘greenwashing problem’ in the industry. As nicely stated by informant C, in exemplifying how the industry can make a perception that they have an emission-free construction site by simply conducting the same procedures as before, but outside the construction site to fulfill goals such as these. Furthermore, all respondents also emphasized that solutions in-house with recycling office waste,

also falls into the same topic, where simple solutions might be done just simply because it provides the possibility to say 'We are green because we are doing this.' However, the Environmental Parks, could be argued are actually solving environmental and social issues.

To summarize, from our findings we saw that the business model has been focused on sustainable value creation the last years. The way it has been focused on creating this type of value, is partially through the Environmental Parks, but also towards climate friendly buildings, which are examples of circular economy in practice. Thus, the connection between how XYZ Construction Group has focused on creating sustainable value, is closely related to a circular economy which is one of the main ways they are attempting to create this value.

8.3 How sustainability and the SDGs have affected the change in activities in the value chain

In this third section of the chapter, we will discuss our findings related to our third research sub-question which was:

Have sustainability and sustainable development goals in the construction industry affected the change in activities in the value chain?

Considering the new taxonomy that is awaiting its implementation in the next years, as a result of the UN's SDGs and the EU's Green Deal (European Commission, 2018; Rosa, 2017), the shift is not only voluntary anymore, but a prerequisite to operate as a business. As the survey in NHO provided, a majority of Norwegian businesses had already begun implementing the SDGs into the business (NHO, 2018). However, the survey had vague definitions of this, as it did not explicitly say how these were implemented and thought of in the respective businesses.

Even though, this focus started in XYZ Construction Group at an earlier stage than when the goals came, the findings implied that they were mostly alone in changing the focus towards more sustainable operation in the industry. Yet, by the time the goals were ratified and implemented, there was a certain shift in how the company should guide itself in the future. In that way, the company not only is acting

according to its corporate social responsibility, but precedes this. As noted in the findings, the goals have given direction to help reaching the goals, thus solving societal issues rather than creating these. The way they have been working to do this is by developing new technology (i.e. the Environmental Park), and seeing how the productivity in the value chain can be altered. Much to the likes of what Porter and Kramer (2011) emphasize is one way to create shared value with implementing this as a focus area in the business model. Building on this, Kramer and Pfitzer (2016) accessed different elements that must be in place in order to develop a shared value creation business model. In this, a common agenda must be reached among the parties found in an ecosystem. These could be perceived as the SDGs as the most relevant common goals, as they are goals that are needed to be reached within 2030, and all parties can contribute to these relatively to their business area. Furthermore, Murray et. al (2017) emphasized that the approach towards sustainability is to engage with the challenges the world is facing. A challenge even more detailed after the implementation of the SDGs.

Similarly, Geissdoerfer (2017) found that sustainability is a condition for circular economy, as they could be seen as a symbiosis in a beneficial relationship. It is the system design that are the main drivers for reaching desired goals, such as defined goals provided by the SDGs. Therefore these goals have been a huge factor in a sudden large-scale change happening in the construction industry. Also emphasized by the informants regarding how BREEAM-certification has been steadily developing and been something the industry must adapt to, especially after the implementation of the SDGs, even though this first came into play in the 1990's.This shows how certifications building on the SDGs, among other factors, has contributed to a distinct shift in how the industry perceives their activities and the need for product and process innovation. We can conclude that sustainability and the SDGs have already had a significant impact on the industry. However, this is only the beginning of change that might come, as much of the innovation and the technology that have altered the productivity in the value chain, thus activities, have not yet provided a disruption in the industry. Rather, it has provided small incremental steps towards a different industry than that of before.

From the findings, informant B, noted how the change that has happened also has been rooted in the organizational culture, where there has been a focus skewed more and more, during recent years, towards sustainability. Although, it has also been rigid, there have been forces pushing for change. Something which also informant A elaborated on with how the perception of a 'climate-friendly person' has drastically changed just in the last ten years. This is something which is a critical force to have in the organization, if change is bound to happen (Nußholz et al., 2019, 2020).

To conclude, the SDGs has been a significant contributor to altering the activities in XYZ Construction Group, but also the business model. Especially, considering how XYZ Construction Group has used the SDGs as a guiding compass, entailing for instance, the application and development of the Environmental Parks. As a result, it appears to be enormous opportunities that the sustainable mindset and the SDGs are pushing forward and what it will create in the coming years.

8.4 Barriers to implementing circular economy ideas in the value chain

At this last section of this chapter, we will discuss our empirical findings related to our fourth research sub-question, which was as follows:

What are the barriers to implementing circular economy ideas in the value chain in the construction industry?

Our findings show that there are several barriers in implementing the ideas of circular economies. The three most brought up were: 1) cultural barriers, 2) structural barriers and 3) the cooperation among actors. With the cultural barriers this constitutes of more internal factors, in how rigid the organizational culture can be perceived by following mostly how it has been done previously with a conservative lens. With structural barriers, this constitutes all standards and regulations connected to the industry, where most respondents emphasized how slow mowing the bureaucracy is. With the cooperation among actors, this constitutes how rigid the ecosystem's collaboration has been, where most respondents emphasized that it was a battle royal among the actors.

The three volumes of Ellen Macarthur Foundation's assessment of circular economy, also exemplified how usually regulations could be a barrier difficult to change, due to the 'fear' of change (Ellen Macarthur Foundation, 2013a, 2013b, 2014). From the respondents, this was also stated clearly, where informant D noted that the possibility of a total disruption is little, whereas small incremental changes might be more suitable for the industry. Several of the respondents noted how the standards that they must meet also sets the minimal requirements given. Although, from our findings, this could also be seen as a double edged sword exemplified with the statement of an emission-free construction site. In the example, this was solved with an 'easy-fix' that actually complied with the regulations. However, with the Environmental Parks as a prime example of how to unfold and see the barriers that exist in the industry, it was a noteworthy story by informant A in his 'circular' story. This shows the forces and barriers in the regulative system, and how difficult change is to happen when there is little to none taking responsibility.

Similarly to Kirchherr et al. (2018), cultural barriers were also noted as a barrier in transitioning from a linear economy. Although, there are forces pushing for changes, the voices become faded in a bigger picture. As noted by informant A, there is still a perception in the industry that circular solutions are much more expensive than its linear peers. Something which shows how the cultural barriers in the industry are hindering a change in several value chains. Even though, the new solutions might be cheaper than the traditional ones, the culture is responsible for creating a misinterpretation of the real world. However, this was noted as something that is changing with a new generation of labor arriving. As stated by informant D, new generations come prepared for interviews motivated by how they can help advance the carbon footprint and with the sustainable work. This is in contrast to earlier, and as also stated by the EVP, this could potentially open up a new competitive edge.

Furthermore, as expressed by most informants, there is also a need to have the whole ecosystem in transition. As the above-mentioned points out, this could be argued is also a barrier that prevents the scaling of solutions such as the Environmental Parks (Kramer and Pfizer, 2016; Mahmud et al., 2017). From the findings, this is an activity that is scarcely used within the group as a whole,

implying both cultural barriers, but also the ecosystematical barriers that exist in the industry. The solution for many of the issues that the industry is facing climate wise are there, but they are still not being exploited. However, this might be due to change in the next years, considering the taxonomy from the EU.

To conclude, there are currently several barriers existing that create a bigger problem, and these cannot be seen individually. This is making a transition a great challenge, as these barriers are not something that can change overnight, as it is deeply ingrained in both the company investigated, but far more in the industry as a whole. Following this, the structural problems are the ones that might be due to a change first, as given by the informants, the industry is mostly controlled by the standards and regulations in how R&D is conducted and also how well intertwined new circular solutions are perceived to be a priority in new projects.

Chapter 9: Conclusion

The study's intention was to shed light on how activities and value chains could change with a sustainable approach, as emphasized by a circular economy. We wanted to examine how this change has happened in one specific firm and its surroundings. This final chapter will attempt to answer our research question with support from the empirical findings and discussion, then touch upon the limitations for our study, and at last point towards what we think will be interesting for future research.

The previous chapter provided a discussion of our research sub-questions with the intention of providing a more nuanced and more applicable way to answer our research question:

How have the focal firm's activities and value chain(s) developed and changed in the last years, towards a different business model and value creation, given the circular economy and sustainable approach it has been pursuing?

Through our discussion we have seen that there is no doubt that the circular economy is changing the value chain and the activities. This is clearly exemplified by the Environmental Parks in our findings, as they have in many ways enabled a

disruption of the industry. They have done this by turning two separate and distinct markets into a single new one, replacing a linear conception with a circular one. Furthermore, this is also happening in other activities in the firm, such as better energy utilization, sustainable buildings, and longer lifespan and recyclability of products and materials. The rigid industry, which has forces pushing in opposite directions, is now bound by a new mindset, which the Environmental Parks entail. As a result, we see that the traditional value chain framework elaborated on by Porter (1985) does not necessarily fit in today's industry.

Assessing the sustainable approach, there has been a drastic change in the firm's business model. By implementing the SDGs as a guidance, with integration of relevant goals for the industry and firm, it has become a more adaptable firm. However, while it is not possible to improve on all areas in a specific manner, it has contributed to change the business mindset towards sustainability. This will be of huge importance in the coming years, given the European Green Deal, which includes a new taxonomy. This new framework might have a much greater impact on other businesses that do not possess proactive responses in their business model.

However, we also saw that by having a sustainable approach it is not self-evident that the value chain and activities will change solely due to such an approach. There are several strong forces acting as barriers to implementing this into the strategy, which is the ultimate goal and necessity in order to create change. Most prevalent is the industry's rigidity, rooted in challenging and slowly adapting regulations. In addition, cultural barriers within the company are a significant impediment. Even though the firm possesses the adequate technology, such as the Environmental Parks, it is not fully utilized due to cultural barriers. Governments need to enact regulations to better adapt to changes pushed by some of the actors in the industry, such as the one investigated in this paper.

To make a final conclusion, based on our findings, there is little doubt that the circular economy has provided a transition from the traditional linear value chain to a circular value chain for central activities in the construction industry. Value chains that involve activities entailing resources and materials now have a new way to create value, which moves away from a more traditional linear way to a more

comprehensible circular way. Furthermore, we believe that strategic partnerships among the various actors in the construction industry value chain will be critical in order to achieve a completely sustainable and circular economy in the industry. We see that this is not something that can be done alone, as collaboration is required to make a significant impact, and by not participating in such a collaboration, you risk falling behind industry competitors.

9.1 Limitations and criticism

Generalizing our results and findings for other companies and industries might be challenging. The results might have been different in another industry, and might have been different if we had examined other companies in the construction industry.

Furthermore, we have previously assessed how our chosen method and how the interviews were conducted can be criticized. However, due to the pandemic, this was the optimal option for conducting interviews. As well as how difficult the pandemic made the data collection, there could also have been even more informants in the study. Next, there could be limitations in how we have interpreted the data, which is prone to subjective interpretations, and as such it might be data we overlooked that other researchers would have integrated or emphasized more. We have tried to minimize this by being transparent, as well as by being two authors with different sets of eyes. At last, we see that this has been a developing area during the work period of this thesis, and it is a field that has rapidly been changing since the beginning of this thesis. This includes new regulatory frameworks and strategic plans that are being proposed, and also have been implemented, such as the Norwegian Government's new national strategy on green, circular economy, and the EU's taxonomy for sustainable activities (European Commission, n.d.; Klima- og miljødepartementet et al., 2021).

9.2 Future research

In our study we have identified several interesting aspects that are worthy of more extensive and different approaches in future research. It could be of interest to further examine a similar study, but in a bigger setting. By exploring more of the ecosystem that exists in the construction industry and investigating other, similar

solutions and how they are advancing the circular economy. Investigating several industries could also help determine whether or not there are bigger challenges in some industries versus others. Another interesting aspect for continued research could be to further investigate the business models mentioned in this paper in other settings, and examine if they lead to the same results.

Following this, it is of interest to assess and further develop the activity-based view and the value chain framework in a more extensive way, as Stabell & Fjeldstad (1998) did, with a focus on circularity in the activities. For instance, it could be interesting to examine a more 'hybrid' model between a circular economy model and Porter's (1985) value chain framework.

Lastly, this study will be interesting to conduct after the EU's taxonomy and the new Norwegian national plan for circular economy are implemented, as this might force previous conservative companies and industries to transition from a linear economy to a more circular one. This concept is under development—especially considering the years after the implementation of the SDGs. As such, a similar study will be important in the coming years, as society has specific issues needed to be solved by the companies.

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Appendices

Appendix 1: List of relevant literature on circular economy

Full list of relevant literature on circular economy can be found here. A more extensive table than that of which is found in *table 1*.

Authors	Definition of circular economy	Key focus
Ellen Macarthur Foundation (2013a, p. 14; 2013b, p. 23)	*An industrial economy that is restorative by intention and design*	**Extensive work on circular economy, with several publications from the foundation. These two are focusing on the impact on society, including policy makers, relationships and cooperation and academia. One noteworthy remark is how it sees the circular economy as a butterfly diagram.**
Bocken et al. (2016, p. 309)	*A circular economy model is characterized by slowing, closing and narrowing resource loops by its design and business model strategy.*	**This paper examines how product design and business model strategies are for businesses aiming on transitioning to a circular economy. It provides a framework to transition from a linear to a circular economy.**
Ghisellini et al. (2016, p. 11)	*By promoting the adoption of closing-the-loop production patterns within an economic system CE*	**An extensive review on circular economy of the last two decades. It aims at creating a base for the**

	aims to increase the efficiency of resource use, with special focus on urban and industrial waste, to achieve a better balance and harmony between economy, environment and society.	**main features, perspectives, similarities and discrepancies of circular economy by examining different levels, such as micro and macro level.**
Webster (2017, p. 16)	*A circular economy is one that is restorative by design, and which aims to keep products, components and materials at their highest utility and value, at all times*	**An extensive book on circular economy. Focuses on the role that governments and companies have in a circular economy. Aims on creating constructs, such as how the social element in the term 'sustainability.'**
Murray et al. (2017, p. 377)	*The Circular Economy is an economic model wherein planning, resourcing, procurement, production and reprocessing are designed and managed, as both process and output, to maximize ecosystem functioning and human well-being*	**Increasing awareness surrounding business ethics. The environmental pillar of the term 'sustainability' is the least exploited in circular economy literature. Re-evaluates the definition of circular economy, based on issues related to the usefulness of the concept.**
Kirchherr et al. (2018, p. 264). *Adapted from Kirchherr et al. (2017, pp.224–225)*	*A circular economy describes an economic system that is based on business models which replace the 'end-of-life'*	**A large case study, focusing on circular economy barriers within the EU. The aim of the study is to unveil the most**

	concept with reducing, alternatively reusing, [and] recycling […] materials in production/distribution and consumption processes, […], with the aim to accomplish sustainable development, which implies creating environmental quality, economic prosperity and social equity, to the benefit of current and future generations	**prevailing barriers in implementing a circular economy, and examine how other studies have assessed this.**
Geissdoerfer et al. (2017, p. 759)	*A regenerative system in which resource input and waste, emission, and energy leakage are minimized by slowing, closing, and narrowing material and energy loops. This can be achieved through long-lasting design, maintenance, repair, reuse, remanufacturing, refurbishing, and recycling*	**A review of the pertinent literature on circular economy. Aims to disclose gaps in the literature and differentiate terms in the literature to find similarities and discrepancies.**
Velenturf et al. (2019, p. 963)	*A circular economy offers solutions for global sustainability challenges through the transition*	**Introduces a new diagram on production-consumption that aims to create a new conceptual**

	from the linear take-make-use-dispose economy to a better organisation of resources. […], in our view, resource flows often contain tightly bound combinations of organic and inorganic materials either due to their natural composition or due to their technical design	**space for the development and implementation of effective circular economy technologies, business models, and policy. Therefore, it aims to redefine the theoretical boundaries of circular economy.**
Nußholz et al. (2019, p. 309)	*Circular business models aim to utilise embedded economic and environmental value in products and materials for as long as possible, for instance through substituting primary materials with secondary materials*	**Examines how business model innovation and policies limit the transition to a sustainable circular economy. Examines, through case studies how business model innovations facilitate strategies and how to mitigate barriers.**
Nußholz (2020, p. 264). *Adapted from Kirchherr et al., (2017 pp. 224-225)*	*A circular economy describes an economic system that is based on business models which replace the 'end-of-life' concept with reducing, alternatively reusing, [and] recycling […] materials in production/distribution and consumption processes, […], with the aim to accomplish*	**A case study that investigates and examines how a company with a business model focused on reused materials has implications for creating value for the firm, the value chain and stakeholders.**

sustainable development,
which implies creating
environmental quality,
economic prosperity and
social equity, to the benefit
of current and future
generations

Appendix 2: Interview Guide

We used this interview guide as a basis for our discussions:

Forskningsspørsmål: *How have the focal firm's activities and value chain(s) developed and changed in the last years, towards a different business model and value creation, given the circular economy and sustainable approach it has been pursuing?*	
Innledning: Vi skriver vår avsluttende masteroppgave om hvordan sirkulær økonomi vil endre entreprenør bransjen. Målet med oppgaven er å kartlegge hvilke følger dette får for den lineære verdikjeden og hvordan aktivitetene endrer seg som følge av dette. Dette spesielt knyttet til at entreprenørbransjen ofte består av typiske lineære verdikjeder som nå er i endring til en mer sirkulær. Vi ønsker å undersøke om endring i aktivitetene fra lineær til sirkulær vil gi en ekstra verdiskapning, da relatert til gjensidig verdiskapning med samfunnet (Creating shared value), for hele verdikjeden og selskapene i bransjen. Vi har en antakelse at en slik forretningsmodell vil endre bransjen betraktelig og er noe som har vært i vekst siden FNs bærekraftsmål ble ratifisert. Særlig vil en slik forretningsmodell, som er basert på bærekraftig verdiskapning, bane vei for en mer effektiv transformering fra en lineær økonomi til en sirkulær.	
Tema	*Spørsmål*

Bakgrunn:	- Navn
	- Utdanning
	- Tidligere jobberfaring
	- Hvordan endte du opp i denne jobben og stilling:
	  o Tidligere stillinger
	  o Nåværende stilling (hvordan endte du opp her?)

Verdikjeden:	- Hvordan ser verdikjeden deres ut i dag knyttet til miljøparken deres?

	○ Har dere møtt på visse barrierer for å endre denne? - Hva slags relasjon har dere til andre selskap relatert til verdikjeden deres? ○ Finnes det aktiviteter hvor dere er avhengig av andre aktører? - Hvordan måler dere verdiskapning som skapes i verdikjeden deres? ○ Har denne endret seg noe over tid eller er den statisk? - Føler dere at selskapet har gått fra en lineær verdikjede til en mer sirkulær etter tiltak slik som de nye forretningsområdene knyttet til miljø og energi?
Aktiviteter:	- Har aktivitetene endret seg i forskjellige forretningsområder, grunnet ny teknologi eller innovasjon? ○ Slik som deres miljøpark? ○ Gjensidig verdiskapning? - Hvordan vil sirkulære løsninger, slik som miljøparken deres, påvirke andre aktiviteter i verdikjeden deres? - Tror dere slike sirkulære løsninger, som miljøparken, vil endre bransjen deres? ○ Fra å være typisk lineær til en mer sirkulær? ○ Hvordan kan dette skape gjensidig verdi for samfunn, andre aktører , bransjen og ikke minst dere selv? - Hvordan er aktivitetene bygd opp hos dere? ○ Sammenlignet med andre selskap i samme bransje? - Gir resirkulering og liknende løsninger merverdi til selskapet deres og til nye prosjekter? ○ I verdikjeden deres? ○ Hvordan måles dette?

Bærekraft:	- Hvordan er deres relasjon til bærekraft, det grønne skiftet og tiltak som anses som «grønne»?
	  o Har noen endret seg siden 2015 i deres aktiviteter og verdikjeden, eller strategi som følge av nye miljømål?
	  o Har dette skapt verdi og eventuelt hvordan og hva slags verdi?
	- Har dere en tydelig forretningsstrategi som konsentrer seg om bærekraftstiltak?
	- Er økosystemet/klyngen vært avgjørende for å overkomme hindre eller strukturer i nærområdet?

Forretningsmodell:	- Har ny teknologi og innovasjon gitt dere et synlig konkurransefortrinn overfor konkurrenter, samt bærekraftig verdiskapning? - Har dere en overordnet plan for å begrense en lineær tankegang og gå over til en sirkulær tankegang, hvor etter hvert alt skal gjenbrukes? o Er det et visuelt konsept dere følger?
Avsluttende del:	- Hva vil du si er de største barrierene og utfordringene knyttet til å skifte mot en sirkulær modell?

Appendix 3: Overview of elements in CSV

As found in *Table 2*, adapted from Kramer and Pfitzer (2016).

Elements	Description
1) **A common agenda**	The participants must reach a common agenda that aligns the parties' vision and joint approach to a solution. Furthermore, this agenda must compromise the parties' interests and perspectives, and should develop by using relationship building to assemble key participants.
2) **A shared measurement system**	The participants must align their list of measurement systems that determine how success will be measured and reported. By doing so, it helps create a formalized common agenda and paves the way for continuous adjustments.
3) **Mutually reinforcing activities**	The participants must engage in activities that are mutually reinforcing. As such, it does not require the participants to do the same activities. Instead, the

	participants should focus on what they are doing best, and this typically involves forming working groups that each address different parts of a problem.
4) **Constant communication**	The participants must build trust and coordination of shared objectives by frequently communicating with one another.
5) **Dedicated support**	The participants should create an environment in which a third actor can assist with a guided vision and strategy, support activities, and a shared measurement practice. These activities can be managed by a single organization or by several, and will serve as a source of information for all parties involved. Furthermore, this needs to be a neutral actor, and as such companies cannot be this support function.

Appendix 4: Overview of informants

As seen in *table 3:*

Informants	Responsibility area	Length and type of interview
A	**Director of one of the Environmental Parks**	Over Zoom **1 hour and 20 minutes**
B	**Head of Environment in the group**	Over Zoom **1 hour**
C	**Director/Head of all Environmental Parks in the group**	Over Zoom **1 hour**
D	**EVP for areas including environment in the group**	Over Zoom **1 hour**
E	**CTO of a company closely collaborating with the group**	Over Zoom **1 hour**

Appendix 5: An overview of the focal company and SDGs

A more extensive overview of the SDGs and the focal company than that of found in *table 4:*

SDG	Relevance for the company	Focal company's aim to reach it
Goal number 9 **Industry, Innovation & Infrastructure** *And* Goal number 11 **Sustainable Cities & Communities**	One of the group's core values is encompassing an entrepreneurial spirit. Through their competence on environmental solutions that meet both today's and tomorrow's standards.	**The group has developed a unique technology to clean and reuse polluted mass. Furthermore, there is a continuous development of energy efficient services and environmentally friendly buildings.**
Goal number 12 **Responsible Consumption & Production**	Through a focus on the environment, climate and reuse they plan on removing materials, and solutions that are damaging for the environment.	**The group is continuously developing its services. Life cycle analysis and tracing recyclability are measurements in all projects. The focus on these numbers is advocating increased environmental responsibility in the group as a whole.**
Goal number 13 **Climate Action**	The group has a focus to limit and mitigate its impact on its surroundings. All the divisions and units each have their own targets to reduce the impact on the environment. As well as how they all must follow	**It is determined centrally in the group that all projects must have a risk analysis prior to the beginning. Environmental risk is a large part of this assessment.**

	the environmental standard ISO 14001.	
Goal Number 7 **Affordable & Clean Energy**	The group is focusing on renewable energy when constructing new buildings, as well as having a new business unit focusing on reducing the risk for customers regarding renewable energy.	**In projects the group is implementing solar panels, and following a BREEAM certification. Furthermore, the group has developed and operates several "energy centrals" providing more attractive and affordable solutions for clean energy.**
Goal Number 8 **Decent Work & Economic Growth**	The security and health of the employees is a focus area for the group.	**The group has implemented several internal regulations regarding HSQE. Furthermore, there are several possibilities for personal development that the group is aiming for with training and courses for the employees.**
Goal number 16 **Peace, Justice & Strong Institutions**	The group is focusing on mitigating "social dumping" and exploitation of workers in projects.	**The group has its own control unit which oversees the different construction sites and projects, to evaluate whether or not it is operating in accordance with its own and other regulations. Furthermore, the group is conducting extensive analysis for potential cooperating partners.**

Appendix 6: Preliminary thesis report

See attachment for preliminary thesis report.