



Universitetet
i Stavanger



**ECONOMIC AND ADMINISTRATION –
SPECIALIZED IN INNOVATION**

**NORWEGIAN INNOVATION COMPANIES RELATION TO
SUSTAINABLE DEVELOPMENT GOALS**



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FOREWORD

This master thesis is the final work on my master degree in Economic and Administration, specialisation in Innovation. Studying at the University of Stavanger has been the most meaningful and the most important milestone in my life, in spite that most of the learning process was carried out online related to the circumstances under the COVID-19 pandemic. Overall it has been a wonderful journey.

I am grateful for having Professor Jan Frick as my supervisor, who has been supportive and showed me the right path for this master thesis. His advice has been understandable and suitable for the research questions and the whole master thesis. I have been learning great things while discussing the thesis, although it does not fit in to mention this in the thesis.

I would like to thank my parents who have supported me during writing the thesis.

ABSTRACT

Introduction is about the background about petroleum industry and mentions the goals as case companies work towards the case companies. There are five companies, which are divided into five cases, Case 1: Aarbakke AS, Case 2: Mento AS, Case 3: Oceaneering AS, Case 4: Stinger Technology and Case 5: Westcon Power Automation. Further it involves two research questions. The first question is about which sustainable development goals (SDG) that are relevant for the case companies and the second research question is about what kind of innovation work the case companies do.

Theory describes the meaning of sustainable development and mentions the SDG that is relevant for these cases. It also defines what sustainable goals is, what innovation is and how it is related to research and development. Further, the subgoals of SDG 4,8,9,12,13 and 17 as well as the theory of the SWOT analyse is described.

Method gives information about the method used in this thesis. Articles, news about the companies from their websites and news sites have been included. Information about the companies' background is written by students from third year of bachelor in economic and administration.

Analysis consists of the background of the five cases and what the companies are working on today. It also shows each company in each SWOT table.

Discussion gives information about the cases relations towards the SDG. It describes which subgoal is related to the cases. Further, the discussion gives a description of how innovation and R&D fit in the case companies

Validation describes how the information, revealed through companies website and news site, was relevant and what I could have done differently, such as meeting face to face with the companies, but because of COVID-19 this was one of the barriers. Also it is not common for companies to share information with master students.

Conclusion gives answers on the research questions and sum up the master thesis to an end. The goal of the thesis is case companies work towards UNSDG, which involve two questions. First research question is which SDG is the case companies is relevant. The answer is that the

subgoal of SDG 3,4,5,6,7,8,9,10,12,13 and 17 are relevant for the company cases. Second research question what is the innovation of case companies, where the answer is each company deliver product and service that is sustainable for the environment and customer.

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CHAPTER 1 INTRODUCTION

1.1 Introduction

United Nation (UN) has its main focus on sustainability development, but what is sustainability development? Why is it an important issue to promote this towards companies, and what are Norwegian companies doing to promote it?

The companies, which will get introduced in this chapter, are related to the oil and gas field. They are suppliers for the oil and gas companies in Stavanger and are located there as well. To bring a clear picture it is important to mention the oil industry's history.

The five companies included in this thesis are Aarbakke AS, Oceaneering AS, Stinger Technology, Mento AS and Westcon group. This thesis will look deeply down on what level the companies are developing according to UN goals and also look at why some of these firms have more systematic goals to achieve than others. Therefore, the research question is formulated as follows:

Goal: Case companies work towards innovation and UNSD goals.

Research question 1: Which SDGs are relevant for the case companies?

Research question 2: What is the innovation in the case companies?

1.1.1 General background about thesis

There are five companies which will be introduced as cases. Case 1: Aarbakke AS, Case 2: Oceaneering AS, Case 3: Stinger Technology AS, Case 4: Mento AS and Case 5: Westcon Automation AS.

The method might be different from a usual master method. The usual method would be to find companies on my own and develop knowledge about the company through interviews and work with the companies towards a research question. In the autumn of 2019, students from economic and administration in subject BØK101 analysed 48 companies. For this thesis, five of these, which are related to oil and gas industry, were selected. Further, this thesis will find out what the companies are doing related to UN sustainable goals by researching what the companies are doing today and how they are working currently. The companies might have been working towards the UNSG without them mentioning that in an interview with newspapers. That will be classified in this master thesis.

2.1 Definition of sustainability

The word “sustainability” is a concept that over a few years has become a popular buzzword in the research arena. It is applied to everything and draining the term of its impact (Brown et. Al, 1987). It is believed that there is nothing that cannot be described or paired as “sustainable”. Although, the massive pervasiveness and popularity has **been** an increasing subject for the past years. It seems to question its history, meaning and what really lies in the meaning of being sustainable for development and practice (Mensah and Casadevall, 2019). In an article by Finkbeiner et al. 2010 cited in Wilkinson et al., it is described that the most important circumstances of sustainability and despite different ways of achieving sustainability, there has been used a variety of disciplines (Finkbeiner, In regards to World Commission on Environment and Development, sustainable development is defined as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED)(1987, p8) from Wilkinson, A., Hill, M and Gollan, P. (2001). As this thesis will take a look on what sustainability means in combination of five companies, it has been described by Clarke and Clegg of page 46, as “ .. *sustainability is becoming a key business imperative, as the eternal search for domination over nature is replaced by the challenge of achieving environmental balance* “(Wilkinson, A., et al. (2001)

2.2 What is United Nations?

Through a survey questioned all over the world, almost ten million people shared their opinion about world issues. United Nations (UN) is about sustainable goals, which are the world’s common work plan to achieve goals within poverty, differences and stop climate change within 2030. One of the descriptions of the sustainable goals is – Leaving no one behind. The most vulnerable human beings have to be prioritized to exterminate poverty.

UN sustainable development goals (SDG) consist of 17 goals and 169 sub goals. The purpose of the goals is to make a common global direction for countries, business and in civil societies. Between 2000 to 2015 education and health got a big breakthrough, as UN got criticised for having most of their focus on poverty. UN’s sustainable development goals are described in the picture below. (UN Nations)



Figure from: Buy1give1

These are the 17 goals UN wants to achieve. Let's see how the companies are working today and which goals they are planning to achieve and when.

2.3.1 Definition of sustainable development goals

The authors from the article “Behavioral entrepreneurship for achieving the sustainable development goals “ by Dhahri, S., Slimani, S., & Omri, A. (2021) have categorized the 17 SDGs into three main dimensions of sustainable development. One of them is economic sustainable, second is societal sustainability and the last one is defined as environmental sustainability. The first category, economic sustainability includes goals 7, 8, 9, 11 and 12. When it comes to goal 1, 2, 3, 4, 5, 10, 16 and 17, they are about social sustainability and the last category is environment sustainability which is associated with goal 6, 13, 14 and 15. To understand what these categories are it is important to present the definition of these names. (Dhahri et al. 2021.)

2.3.2 Economic sustainability

It has been mention in the “definition of the sustainable development” that five of the SDG goals are included in economic sustainability, such as renewable energy (7), good jobs and economic (8), innovation and infrastructure (9), sustainability cities and community (11) and

responsible consumption (12). According to Lobo et al. 2015, cited in Dhahri et al.(2020) mention by the word “economic sustainability” is described as a system that does not compromise future needs while giving out production that covers the needs of today’s consumption. Although, authors Basiago (1996,1999) and Du and Kang (2016), cited in Dhahri et. Al thinks that exhaustion of the stock of natural resources has come from increasing the size of the economic system. This has taken the traditional economic methods to a different level. As the extreme consumption of natural resources are limited and mostly of them are non-renewable. Numerous of authors have discussed the excessive consumption of natural resource towards economic growth. They suppose by increasing demanding of goods and services in pushing markets without thinking about the effect towards the environment. Example could be depletion and pollution. (Dhahri et al. 2021.)

2.3.3 Social sustainability

The next system mention was “social sustainability. This is related to people and includes social equity, livelihoods, cultural identity, community development and institutional stability. As mentioned, the UN goals viewing social sustainability are no poverty (1), no hunger (2), good health (3), quality education (4), gender equality (5), reduce inequalities (10), peace and justice (16) and partnership for the goals (17). The aim of the concept “social sustainability” is the development of individuals, focus on good health care and education quality, gender equality, societies, culture and stability across the world. Author Guo (2017) cited in Dhahri et al. 2021) thinks that social sustainability is related to major issues, like human rights, public participation, justice and law for peace and social stability. Author Guro also claim that the motive of social sustainability is not to ensure other’s needs, but to cover their needs which they desire. It has also been argued, by some authors, that it is difficult to reach the state of “social sustainability”. The causes for that are the complex and strongly intangible compartments with economic sustainability and environmental sustainability where the economic system is visible and the capital flows. ((Dhahri et al. 2021.)

2.3.4 Environmental sustainability.

The rest of the UN goals lies under environmental sustainability. The goals are clean water and sanitation (6), climate action (13), life on land (15) and peace and justice (16). The word “environmental sustainability” lies around a responsible interaction with the ecosystem, which remains productive and renewable to support the future of humankind with long-term environmental quality. Also ecosystems have to be regenerative by consuming natural

resources in proportion to their regeneration and eliminate the waste which can destroy the environment. Another reason is the uncontrolled growth that puts pressure on the Earth system which would disrupt the maintenance of the Earth's equilibrium. Due to the need of the environmental sustainability the effects of climate change are associated. The climate change is basically the result of natural climate variability or by human activities that have significant and long-term side effects on the climate system. ((Dhahri et al. 2021.)

2.4 Which SDGs are appropriate to be invested by companies? According to a paper by William Schramade, it all depends on the investor's goals which SDGs should be invested from the company. Also it has to be considered which ability and attractiveness has investment opportunities. It is most interesting that SDGs invests where there is transformational potential and where corporates can make a real difference. An example is the sustainable development goal 7, which is known by the name "clean and affordable energy". A place this goal can be relevant is aluminium production, where the industry have the opportunity to reduce by sourcing clean energy. According to the article the goal 7, clean and affordable energy is the most investable planet goal. Through this it gives opportunities to renewable energy, such as windmills, but also in its suppliers and in enablers of energy efficiency. Schramade assumes that innovation is not just about technology, but also about new business models that transforms industries, lives by offering products in a new and more valuable ways and also transforms the value chain. (Schramade, w. (2017)

2.5 Description of the UN goals

Further, there will be a description about the UN sustainable subgoals. As mentioned there are 169 subgoals, but only the sub goals which are suitable for these cases will be described. These goals are described in tables and are copied from the website United Nations.

2.5.1 Description of the UN goal 3

This goal is called "Good health and well-being". It ensures health and well-being for everyone at every stage of life. It includes health priorities, reproductive, maternal and child health; communicable, non-communicable and environmental diseases; universal health coverage; and access for all to safe, effective, quality and affordable medicines and vaccines. They also work towards more R&D, increased health financing and straightened capacity for all countries in health risk reduction and management The Global goals (n.d.)

3.d Strengthen the capacity of all countries, in particular developing countries for early warning, risk reduction and management of national and global health risks

2.5.2 Description of SDG 4

This goal, “quality education”, is targeted to provide every child, all over the world, education. This is one of the ways to achieve challenges of quality and equity. Some companies that are international is supporting this sustainable goal to get achieved. The Global goals (n.d.)

4.3 By 2030, ensure equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university

4.4 By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship

4.7 by 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture’s contribution to sustainable development.

4.a build and upgrade education facilities that are child, disability and gender sensitive and provide safe, non-violent, inclusive and effective learning environment for all.

2.5.3 Description of UN goal 5

A way to waste the world’s human potential, is done by denying women equal rights. It is equal to deny half of the population a chance to live life at its fullest. Giving political, economic and social equality for women will benefit the world’s citizens The Global goals (n.d.)

5.1 End all forms of discrimination against all women and girls everywhere.

5.b Ensure the use of enabling technology, in particular information and communications technology, to promote the empowerment of women.

5.c Adopt and strengthen sound policies and enforceable legislation for the promotion of gender equality and the empowerment of all women and girls on all levels.

2.5.4 Description of the UN goal 7

Goal 7 is known by the name “affordable and clean energy”. Renewable energy solution is becoming cheaper, efficient and more reliable day by day. Today’s reliance on fossil fuels is unsustainable and harmful to the planet. This is the reason United Nations has demanded to change the way the production and consuming of the energy is. It is demanded that new energy is made as quickly as possible The Global goals (n.d.)

7.1 By 2030, ensure universal access to affordable, reliable and modern energy services
7.2 By 2030, increase substantially the share of renewable energy in the global energy mix
7.3 By 2030, double the global rate of improvement in energy efficiency
7.a By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy

2.5.5 UN sustainable development goal number 8

The sustainable development goal number 8 is called “decent work and economic growth”. This goal gives the awareness to people that while making financial progress it is important to avoid harming the environment. While talking about business it is important to protect labour rights and stop modern slavery and child labour. By promoting job creation with expanded access to banking and financial services The Global goals (n.d.)

8.2 Achieve higher levels of economic productivity through diversification, technological upgrading and innovation, including through a focus on high-value added and labour-intensive sectors
8.3 Promote development-oriented policies that support activities, decent job creation, entrepreneurship, creativity and innovation, and encourage the formalization and growth of micro-, small- and medium-sized enterprises, including through access to financial services
8.4 Improve progressively, through 2030, global resource efficiency in consumption and production and endeavour to decouple economic growth from environmental degradation, in accordance with the 10-year framework of programmes on sustainable consumption and production, with developed countries taking lead
8.7 Take immediate and effective measures to eradicate forced labour, end modern slavery and human trafficking and secure the prohibition and elimination of the worst forms of child labour, including recruitment and use of child soldiers, and by 2025 end child labour in all its forms.
8.8 Protect labour rights and promote safe and secure working environment for all workers, including migrant workers, in particular women migrants and those in precarious employment

2.5.6 UN sustainable goal number 9

The 9th UN sustainable goal is “industries, innovation and infrastructure”. According to UN sustainable goal is the dynamic and competitive economic forces that can generate employment and income. As it introduces and promotes the new efficient use of resource, facilities, international trade and promote the new technology. As the innovation and technology progress is the main key of solutions of both economic and environmental

challenges, it can increase resource end energy-efficiency The aim of investing in innovations and new technologies is to help to make it affordable for all. It is no doubt that new technologies take time and effort to develop, which probably means a higher cost to adopt. With this innovation goal it is expected to achieve reduction in the cost and not give higher cost when it is not necessary. The Global goals (n.d.)

The DSG of 9th have some underlying goals, which can be suitable for companies, mentioned by UN goals.

9.1 Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all
9.2 Promote inclusive and sustainable industrialization and, by 2030, significantly raise industry’s share of employment and gross domestic product, in line with national circumstances, and double its share in least developed countries
9.3 Increase the access of small-scale industrial and other enterprises, in particular in developing countries, to financial services, including affordable credit, and their integration into value chains and markets
9.4 By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities
9.5 Enhance scientific research, upgrade the technological capabilities of industrial sectors in all countries, in particular developing countries, including, by 2030, encouraging innovation and substantially increasing the number of research and development workers per 1 million people and public and private research and development spending

(United nations)

2.5.7 UN Sustainable development goal 10

This goal 10 is about “reducing inequality within and among countries”. It is found that the world’s wealth is held by a very small group of people. To achieve nations to flourish, equality and prosperity has to be available to everyone, no matter their gender, religious beliefs or economic status. The Global goals (n.d.)

10.3 Ensure equal opportunity and reduce inequalities of outcome, including by eliminating discriminatory laws, policies and practices and promoting appropriate legislation, policies and action in this regard

10.4 Adopt policies, especially financial, wage and social protection policies and progressively achieve greater equality

(United Nation)

2.5.8 UN Sustainable development goal 12

The 12th goal of UN is named “Responsible consumption and product”. In this goal it is defined that our planet provides us with an abundance of natural resources. Also this goal aims that people must learn how to use and produce in sustainable ways that will reverse the harm that we have inflicted on the planet The Global goals (n.d.)

12.4 By 2020. Achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment.

12.6 Encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle

12.7 Promote public procurement practices that are sustainable, in accordance with national policies and priorities

(United Nation)

2.5.9 UN Sustainable development goal 13

This development goal is called “climate action”. It has pointed out that through education, innovation and adherence, the climate commitments which are necessary to protect the planet. Large opportunities to modernize our infrastructure will be provided through these changes, which in turn will create new jobs and promote greater prosperity across the globe. The Global goals (n.d.)

13.1 Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries

13.2 Integrate climate change measures into national policies, strategies and planning

13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaption, impact reduction and early warning.

(United Nations)

2.5.10 Sustainable development goal 14

The SDG 14 is called “quality education” and says that learning benefits for human beings should be available for all. The Global goals (n.d.)

14.1 By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution

14.2 By 2020, sustainably manage and protect marine and coastal ecosystem to avoid significant adverse impacts, including by strengthening their resilience and take action for their restoration in order to achieve healthy and productive oceans.

(United Nations)

2.5.5 Sustainable development goal 17

The last goal of the United Nations is called “partnerships for the goals”. This goal is about working together to achieve the goals, which according to UN, is the only way to achieve innovative technological development, fair trade and market access, especially for developing countries. It is important to be empathetic, inventive, supportive, passionate and cooperative.

(The global goals)

17.16 Enhance the global partnership for sustainable development, complemented by multi-stakeholder partnerships that mobilize and share knowledge, expertise, technology and financial resources, to support the achievement of the sustainable development goals in all countries, in particular, developing countries monitoring frameworks that support the achievement of the sustainable development goals.

17.17 Encourage and promote effective public, public-private and civil society partnerships, building on the experience and resourcing strategies of partnerships data, monitoring and accountability.

(United nations)

2.6 What is innovation?

Joe Tidd and John Bessant have described innovation as change. Innovation is a Latin word and comes from the word *innovare*. A definition that is mentioned by Tidd and Bessant is “the process of creating value from ideas”. Value can be defined as creating a product or service that other individuals find useful and valuable. Tidd, J., & Bessant, J. (2014).

2.7 Research and development connected to innovation

All the activities which are included when innovating and introducing new products and services, is called research and development (R&D). The idea is to take new products and services to the market and increase the firm's value. Through these activities companies get an opportunity to stay ahead of its competition among other industries. Without R&D a company may not survive as it is difficult to follow up the other companies who are currently working on R&D. On a short-term it does not increase the profit of the company at the start-ups within R&D, therefore they have to estimate the risk-adjusted return on their expenditures. The more capital one invests in R&D, the higher its capital risks become. Another way of including innovation in the company is to outsource their R&D on a decent cost. (Kenton, 2020)

The relation between R&D and economic growth is from a Schumpeterian point of view pointed out that the returns of every nation or region's R&D efforts tend to be positively connected with the amount of resources devoted to improve technology and achieve rewards from strong cumulative effects. The larger the effort of R&D is, the larger the expected return would be. This explains that investment and employment in R&D are likely to encourage the development of economic activities in large territorial units where R&D can easily be made. Research spillovers: operation in firms with little or no R&D activities can get benefits from technological progress provided to the adequate industrial and communication networks located in areas where innovation is generated. Moreover, the early adopters of innovation, called innovation-prone societies, are capable of transforming a larger share of their own

R&D into innovation and economic activity. There are few explanations how some companies are successful to transform R&D activity into economic returns. A firm that has short-term applied R&D gets larger economics returns, than a firm that has long term and general R&D. Other reasons are how the local economic structure, nature and type of production factors, the predominant model of ownership and the dimension of interfirm linkages effects the return from R&D. (*Rodríguez-Pose, A. 1999*)

2.8 What is autonomy?

There are many definitions of autonomy. According to a paper by NFA autonomy group autonomy is a system that has the ability to achieve operational goals dominated by taking decisions in cooperation with humans and on behalf of humans. It can also be understood as automating work. The increasing level is made through computerized sensing, monitoring, control of physical process and systems. Basically, computers are taking over tasks that human used to do or is difficult for humans to accomplish. Autonomy guides the firms to get an improved performance or accident prevention. According to the author Fjellheim cited in NFA autonomy group, 2012, autonomy can be defined as “Autonomy is the ability of a system to achieve operational goals in a complex domain by making decisions and executing actions on behalf of or in cooperation with humans”. Autonomous systems are systems that are able to perform high-level problem and unforeseen situation getting solved without human intervention. (*NFA autonomy group,2012*)

2.9 SWOT analyse of the companies

According an article written by Thompsen et al. 2007 cited in .(Gürel, E.,and Tat, M. (2017) SWOT analysis is a powerful tool that summarizes an organization’s resource capabilities, deficiencies, market opportunities and the external threats to its future. SWOT analysis is described as a strategic planning framework used in evaluation of an organization. It can be named as a plan, a project or a business activity.

SWOT analysis is a significant tool for the company’s manager to help identify organization and environment analysis. The SWOT analysis has two dimensions called internal and external dimension. Internal dimension includes organizational factors such as strengths and weaknesses. The second dimension is called external dimension which describes the company’s environmental factors, like opportunities and threats. Further it will be described what these four factors tells us.(Gürel, E.,and Tat, M. (2017)

2.9.1 Strengths in SWOT

The S in SWOT stands for Strength. This factor characterises the value of the organization that make it more unique than others. Strength refers to a creative, favourable and positive characteristic. It gives a clearer picture of the situation in which an organization is more effective and efficient compared to its competitors. The organization can be described as equal, strong or weak compared to their relative competitors on bases such as market situation, relative financial structure, relative production and technical relative research and development potential, relative human capacity and management effectiveness. It is important that the organization knows that the strength plays an active role for them to achieve the goals. The organization has to know which aspects make it more advantageous than its competitor. If this is unknown to the organization, the opportunities cannot be used to achieve the organization's goals as it is linked to the strengths of the organization. (2017)

2.9.2 Weakness of the organization

The meaning of weakness is about disadvantages compared to other things. In other words it is characterised as a negative and unfavourable object. Weakness of an organizational level refers to the current existence and ability capacities of an organization that are weaker compared to other organizations. Authors Thompson and Strickland sum weakness up as *“A weakness is something an organization lacks or does poorly. In comparison to others- or a condition that puts it at a disadvantage”*. From authors Pearce and Robinson it is described that the weakness is limited or deficiency in capabilities, skills and resource that seriously impedes an organization's effective performance. Other objects in the organization can be described as a weakness are financial resources, management, capabilities, facilities, marketing skills and brands' images. (Gürel, E., and Tat, M., 2017)

2.9.3 Environmental opportunities

The definition of opportunity is a situation or condition suitable for an activity. It is an advantage and the driving force that an activity takes a place. These opportunities would be positive results for the organization determined as a result of the analysis of its environments. It allows an organization to take advantage of organizational strengths, overcome organizational weakness or neutralize environmental threats. (Gürel, E., and Tat, M.,2017)

2.8.4 Environmental threats

The organization have some elements that make it difficult or impossible to reach the organizations goals. The result of the situation comes out of the changes in the distant or the immediate environment that could be preventing the organization from maintaining the existence, lost or competitions that are unfavourable towards the organization. It can also bring unrecoverable damages. Overall factors that are efficiency and effectiveness can be underlined as threats for an organization. Surprisingly, a globalisation involves both opportunities and threats. Gürel, E., & Tat, M. (2017)

3.1 Purpose

The purpose with this thesis is to discover how companies are working towards development and how the development is related to the sustainable development goals. According to Kitto et al. a report of a qualitative study should be considered as robust procedural description as other studies. The adequate description, explanation and justification of the methodology and methods should be understood by a reviewer. (K.Hammarberg, 2015)

3.2 Choice of method

Qualitative methods are understood by investigation of belief, attitudes and concept of normative behaviour. It can be personal perspective, analyses of text and documents like government reports, media articles or websites that learn about distributed or private knowledge. (K.Hammerberg, 2015)

The information which is used in this thesis is articles that describe how companies can work within the sustainable goal. Also the book of John and Bessant has been included where it has been described what kind of innovation there are. Through news resources such as teknisk utdanning and DN I found out what the companies are currently doing and what their future plans are.

3.3 Analyse from document

Document analyses are described as articles, books, research articles and websites. It is common to use these kinds of documents for thesis like this. The method could be used alongside with other methods or the only method for a thesis (Bowen, 2017).

However, documents that use qualitative method has both positive and negative effects. At first the positive effects are being mentioned.

Rather than get the resources by myself, there is a method to obtain the information from websites, like I have done in this thesis. One can find articles and other sources which are available for everyone. Analyses from documents are precise as it is referred to articles and researchers.

On the other hand a negative effect can be seen to be discovered, while using this type of analyse. The article that is being used could be written for some other researcher and it can be difficult to find articles that are exact as the research question. However, one will use the articles that are the most suitable for one's own thesis. The website, or other sources, can be

limited or blocked after a while, even if it is an open source. At the end it is important to be critical towards the article (Bowen, 2017).

3.4 Explanation of the method choices

The way I have chosen to promote my research question might be seen as a negative effect. I did not create my own data, but I have interpreted sources and articles through the internet. A positive sign within this study can be that it is an open answer and it can have assumptions at different levels. One of the reasons why I chose not to interview persons, like leaders from the companies, is that one might not be able to disclose information about their future plans, goals or methods. Also future development might be a sensitive state for the company. Secondly, there is lots of information shared by the companies in different media or on their own websites. Other reason for this method is that due to COVID-19 it may be difficult to meet face to face and not everyone is comfortable with being open through an online meeting.

4.1.1 Case Company 1 Aarbakke AS

The company Aarbakke AS was founded by Inge Brigte Aarbakke's grandfather in 1918. This company was based on horseshoe production back then. After 63 years, in 1981, the company switched from producing horseshoes to expand and buy the local mechanic company, Jær Mek. An engineer company within offshore, Nodeco bought Aarbakke, which again got bought by Weatherford - an American multinational oil service company. *Hasanova et al (23.10.2020)*

Inge Brigte bought his family company back in year 2000. Aarbakke got new and modern location production with high standards. Later on it was necessary to expand the location as the growth and demand increased in 2008. The production and service is within oil service companies, such as Equinor and Aker Solution. The company export about 70 % of the production to the international market and 30 % of the market is from Norway. The production is specialised on complicated components and technologies from customers' requirements (2020)

In 2009, Aarbakke launched a fabric in China which is 6000 m², where the industry has responsibility of the ship equipment industry and rough handled the castings before delivering it to Norway. The rest of the work was going to continue in Bryne. However, the fabric work could not be continued, as the customer demanded to keep all the production in Bryne. Though the production stopped in China, the international market is still a goal. (2020)

Aarbakke has specialized their production through Computer Numerical Control (CNC), which is a computerized machine that is used in drilling, slipping, turning and milling cutters. CNC are used to process materials and Aarbakke AS has one of the world's highest advantages within CNC in the oil field. The materials Aarbakke is working with are steel production and materials that are used in drill holes and subsea-equipment. (2020)

The company has large potential in doing business in Brazil. When it comes to Aker Solution, Aarbakke AS is an undersupply within the oil field in the North Sea, such as Johan Sverdrup

and Johan Castberg, where Equinor work as an operator. Aarbakke is a company that can reduce the risk for compensator fault on floating drill and a firm with strong background in machine technique and machining. This is the reason Scan Tech Group chooses to have Aarbakke Company as a supplier. (2020)

The company works through an effective supply chain. The steel quality the customers of Aarbakke want is made in Italy. The same type of steel quality can get delivered from Jørpeland. Aarbakke has chosen to use the steel from both, Italy and Jørpeland. This type of steel quality is the only one which is accepted within the oil field. After Aarbakke has made a product of the material, the product is kept at a warehouse, 100 meter west of the firms' location. The product is tested and has to go through a quality control before the customer receives it. (2020)

Companies have different goals and ambitions for themselves. The most important thing for Aarbakke is to achieve zero occupational injuries through safe, secure and good working environment. Each work strategies plans and performs. The employees are committed towards protecting the environment, including CO₂ emission, comply commitments and improving the environment. The Norwegian working environment act, called health, safety and environment (HMS) is the law Aarbakke AS is following. Aarbakke AS' main target is to deliver products high in quality. (2020)

One of the customers that Aarbakke AS has a partnership with is an anchor and mooring cutter, Control Cutter AS. It is involved in high risk operations because of the voltage and sudden movement that can damage the equipment. Aarbakke AS offers products, such as Subsea-Chain Cutter that cuts whatever chains in five minutes. Scan Tech is a company that has given service to oil and gas industry. They recently needed a better supplier for their project - The Weak Link Bail. This project needed someone with good technology within machine and mechanical engineering. Scan Tech chose to work with Aarbakke again, as they performed well in design and production of different variations.

As mention Aarbakke is one of the largest on milling and turning. The CEO Inge Brigte Aarbakke has learned from Australia that the same machines can be used in a different way. In Australia the machines got used to produce artificial body parts. Later on Aarbakke Medical got established. The project was about making artificial hips. It seems practical to use

different kinds of technology in other area than the oil and gas field, because in future time, oil and gas field might demand fewer products. However, this innovation project did not happen as the oil price affected the project.

Aarbakke is competitor to Malm Orstad AS (M.O. AS). M.O. AS is specialised in mechanical and hydraulic product within the oil and gas industry. They focus on aquaculture for the future. They are working to introduce Mazak-machines; hence Aarbakke has worked with the Japanese Mazak Corporation for 25 years. The downfall in the oil price in 2014, was a difficult year for Aarbakke, but they have been in a better situation during the COVID-19 till now than their competitors M.O. AS. (2020)

4.1.2 Case company Mento AS

Mento AS is a family business that was developed as Mento Oil Field Service and founded by Bjørn Dahle in 1971. Mento Oil was a small firm that had ambitions to deliver goods and service to oil and gas industries. One of the largest customers of Mento Oil is Equinor. Mento Oil work method was to maintain former products and innovate new mechanical solutions for oil platforms. As the Mento AS was growing, the named changed to Mento Holding AS. (Johansen C., et.al 23.10.2020)

The growth for Mento AS was not an easy one. In 1971 the company got a deal with Phillips Petroleum, which was the first company that began the development of oil and gas in the North Sea. Mento AS got the responsibility for transporting personnel and post in Stavanger region. After 17 years, in 1988, the deal ended. After eight years, in 1995, they got a business deal with Equinor. Further, in 2005, Mento AS delivered filter products to Equinor's construction on Melkøya (2020)

Other customer Mento AS has a contract with is Eni Norway. The deal was to provide service and maintain pipes and pipe systems at the Goliat platform. The company also had a warehouse to keep the equipment that was relevant for Eni Norge. Moreover, in 2014, Mento AS started delivering filter systems to Statoil all over the country. A contract with Engie E&P was undertaken in the sector of Bergen. Both, Equinor and Engie got deliveries through Mento AS until 2015 and 2020. The deal with Equinor secured Mento AS 84 workplaces and finally the contract got renewed to 2023. Mento AS has future plans to search for oil on the Norwegian continental shelf. (2020)

The production design and quality is important to the company, according to their webpage. Moreover, they are focusing on sustainable in regards to design. As for now the parts of the product is assembled seamless. Their goal is to use materials that can be secure and sustainable, along with minimizing the waste. The supply-chain for Mento AS is a firm called Continental. Continental produce the raw material which is delivered to Mento AS. Continental also produce the pipeline, which is further used or developed by Mento AS, as the customer wants. (2020)

The company has large focus on development, purposeful and training willing manager and employees. They focus on recruitment and career development among their own, continuous improvement and development on the professional level of competence. They also think it is important to support the individual in their own development, that is why Mento AS has established “Mentoskolen” and leadership development program. Through Mento’s own health program they give awareness raising and prevention activities to improve employee health (MENTO, career)

As for Mento AS the COVID situation has resulted that the customers has bought less products and the company had to cut out the costs. Although, leader Bjørn Anders Dahle told news Vestnytt, that the oil crisis has not affected them much and they have been able to survive through it. (2020)

4.1.3 Case company 3 Oceaneering

Oceaneering international was developed in Delaware in 1969. The firm was established on Norwegian offshore in 1973. Oceaneering was different from Oceaneering International, that along with having the same service as Oceaneering International, dealt with being internal firm-financial. One of the most attractive matters with Oceaneering is the placement near the North Sea. The firms’ placement makes it easier to distribute products and services to customer such as Equinor and Aker BP. Oceaneering found out through a survey that it is an ultimate for the firm to be close to their customers. (Bjørheim M et al. 23.10.2020)

Oceaneering has large and new test pools which are used for testing the ROV and other types of underwater equipment. The firm’s building has a department of simulator facility that is

used for education and training. The working way is not different from the model of the firm S.T. The oil industries send out a proposal of projects and chooses firms that have the ability to do the job. One of Oceaneering's main keys for succeeding in the market is innovation. The firm's work is based on remote and computer control, which makes it easy for ROV-pilots to be on the ground while controlling the work under the ocean. With the new AUV-technology the work has become more electric based and moreover the firm is working through 4G developed by themselves. (2020)

In October 2019, the firm tested AUV on Tau in Rogaland. The AUV could be on the seabed for 6 months and could work within 2-4000 km, including up to 6000 m.a.s. The company has also produced a charge station that is permanently on the seabed. This method gives easy access to new energy between each operation. Another benefit of using this technology on underwater equipment is to give more security, less costs and save the environment. (2020)

In 2011 Oceaneering acquired two companies; Norse Cutting & Abandonment (NCA) and AGR Consultancy Services AS (AGR). The firm capitalised NCA for 1.4 million kroner and AGR for 330 million kroner. The idea of investing money into NCA was to get easy access to borrow ROV and vessels in the North Sea. Through this investment Oceaneering got larger contracts as a supplier. The other investment in AGR, motivated Oceaneering existing customers to make inspections with the Oceaneering ROV-fleet (2020)

The Oceaneering is also working to achieve the UN's sustainability goals. The goal is about stopping the climate change within 2030. The company also considers equality, human rights and education for the Oceaneering. The education involves courses, potential learning at the workplace in the company. Moreover, they make sure it is no slave-work during the supply chain and the customers get to produce securely. This is the reason Oceaneering is doing research and development on their own products. (2020)

4.1.3.1 What is ROV-technology?

ROV stands for Remotely Operated Vehicle and are underwater robots that are supposed to be above the water. ROVs have an umbilical link that is connected to the topside, which gets transferred through an energy source and information transfer through an umbilical link.

The offshore oil and gas industry rely on ROVs for drilling support and subsea construction services to enable deep water exploration and development projects worldwide. It is believed that oil and gas industry are going forward to subsea environment and that is why ROV is becoming an important tool in drilling, development and repair. As mentioned that S.T develops ROV in addition to complete the project for Equinor, shows how inventive they are. *Rigzone. (n.d.)*.

4.1.3.2 What is AUV?

AUV is short for Autonomous Underwater Vehicles, which are computer controlled systems operating undersea. AUV is considered to be autonomous is because it has no physical connection towards the operators. The operators might be onshore or offshore. AUV are self-powered vehicles. Earlier, AUVs were operated as long cylinders that kept moving. As the technology developed AUVs has adopted new forms and functions. (Denice C., 2008).

4.1.3.3 How does AUVs work?

There are different types of AUVs. The AUV can glide from the sea surface to ocean depths and back. It can also stop, hover and move like blimps or helicopter. The company mentioned in this thesis work under the sea. It is designed to work I different shapes of water, as between the limits of high and low tide. Some AUVs are designed to operate up to 6000 metres and the most advanced undersea system can reach at 11.000 meters of the bottom of the ocean (2008)

Oceaneering has sales revenue that has changed from 2015 to 2019. It got affected by the oil crisis in 2016, that led to that the demand of the product and services went down. IT is related to that the oil companies had to reduce their costs and investments (Bjørheim M et al. 23.10.2020). Oceaneering had a great activity in the company, but because of fewer projects they had to terminate many employees. The employees who were terminated were young and they were terminated twice, once in 2020 and once 2021. It is not clearly under which circumstances there are fewer upcoming projects, it can be implicated that it is caused by the COVID-19 pandemic (*Mullis, 2020*).

4.1.4 Case 4: Stinger Technology AS

Stinger Technology is a firm located between Tasta and Bjergsted, a few minutes away from the oil city Stavanger. The name “Stinger” is inspired by the mouth size of a mosquito. The

idea of Stinger is that small things can make big changes, as the under the title Stinger is “if you think something small is unable to make a change, try going to sleep with a mosquito in the room”. The firm was confirmed as Stinger in 2003 by Bjarte Langeland, later it got established as Stinger Technology AS (S.T.). The firm stands as an innovative solution provider focusing on lightweight, cost efficient subsea systems, design and manufacturing at a range of innovative solutions for subsea use in the offshore and gas sector. S.T. develops small low-priced effective systems and package to customers. This includes the design and production of the systems, and also specific projects. The firm develops programs and physical products, that also can be produced and distributed to oil service companies all over the world. S.T. wants to be recognized as an integrated, curious and innovated firm. The firms’ mission is to be a firm that delivers products and services that no one is already delivering. They also consider that it is important to avoid damage on the nature and the environment and personal injuries. Offshore Technical school which are a practical school where S.T has access to a quay accredited to the international ISPS-code of ship mobilization and mechanical garage nearby. Moreover they have the ability to do test of the underwater technology they are developing to secure it against leaks. *Venus G. et al (2020)*).

One of the most important oil and gas province firms; Equinor, made a contract with S.T. in April 2020. The project was within underwater inspection. Equinor was one of the customers of S.T. before this contract got issued. The firm developed a new technology to complete this task for Equinor, ROV-technology. Moreover, Equinor is not the only customer of S.T., but also firms like Kawasaki Heavy Industries Ltd. and Neptun Energy approach the firm. The tool S.T. used to complete the project for these companies were autonomous underwater vehicles (AUV). The AUV has a robot arm that performs undersea pipeline inspection. One of the main reasons that S.T. won project deals with these companies is that S.T. offers technology that covers their need. They also offer a suitable price for the service they make. S.T produces some of the underwater drowns themselves and order some of the production from other supplier as VideoRay and Saab Seaeye. S.T. is not a firm that has a lot of production in their storage. They produce as the customers have a need for the product or service. This structure can be assigned as the Japanese work way “just in time” and the lean structure. The firm avoids waste and products or services that are outdated (2020)).

It was told, by Langeland, that because of the oil crisis in 2015, the sales revenue had a downfall with 90,6 %, told in the interview by Teknisk Blad. The sales revenue was 21.5

million kroner in 2014 and only 2.03 million kroner in 2015. Fortunately the sales revenue increase at 13.97 million kroner in 2019. (2020)). It is not found information on whether the company was affected by COVID-19 as there is not information about the sales revenue for 2020 cited proff in (2020).

4.1.5 Case 5 Westcon Group

The last company that is presented in this master thesis is Weston Power Autonomy (WPA). The company works within electric installation of new construction and remodelling, along with performing services on different types of vessels, offshore units and land production facilities. When it comes to the oil and gas industry, WPA has performed a project called “EIT”, with responsibility on 110 rig yards stay and many projects offshore. WPA also works to service for rig yard owners, drilling controllers and other oil service (Haukland 23.10.2020).

Moreover, WPA offers services including fixing, customer support and upgrading of the production. They also work within machine security, automation control, electro and automation. WPA’s service has taken advantage of their ability and also makes solutions that are suitable for aquaculture and marine (2020).

One of the systems WPA stands for is e-SEA®, which is electro and automation systems and solutions that covers different choices between technical and component solutions. The system e-SEA® delivers products within alarm control, load control and tank sound systems (2020).

The main goal for WPA is to be a part of the green environment and fulfil sustainable development and innovation and the focus is to be more sustainable in development and innovation of electric systems and automation systems. In January 2019 WPA signed a deal with designer in LMG Marin with Norled about building the world’s first hydrogen vessels. As WPA only produce products that customers want, the demand of hydrogen vessels came from Statens Vegvesen. Further, the product had a demand from the customer to make the vessels on hydrogen at least 50 %. The rest of the energy was going to be from electric charge

at the quay. Since this is not something WPA was able to do alone, there were other firms which helped in establishing the rest of the hydrogen vessels (2020).

In 2010 WPA developed Continuous Motion Rig (CMR), which makes it possible to drill without stopping joining the pipe lengths. The idea of CMR is to reduce the risk while drilling. Through this no workers are needed as the process is automated. This can reduce the drilling cost with 50 % and change the way oil is being drilled. The supporters are Equinor along with Demo 2000, Shell and Conoco Phillips. Since 2015 WPA has developed the bottom seismic nodes for the next generation. In April is a Norwegian independent supplier of OBS technology as the fully integrated ocean bottom node based seabed seismic solution developed seismic nodes that emphasised special through data processing and operational logistics. Seismic companies around the world can take advantage of these solution as the seabed seismic and can give large savings for seabed seismic companies. Large savings can come in many aspects as the battery days of the seabed seismic system is 100 days, it has built in positioning transponder and gives handsfree operations. (Westcon Yards (2020)).

WPA signed a contract with Equinor in 2016. The contract was an operating agreement for electrical and instrumentation with Equinor's gas processing plant at Kårstø. WPA got this contract because of the competence and experiences the company has within areas such as rig, ship and industry. The WPA company provides innovative Electrical and Automation Solutions. A mobile application has also been developed; Westcon IRM-Ex, that is used for inspection of electrical equipment installed in hazardous areas (Hvitved-Jacobsen, 2016)

WPA believes in high education, therefore WPA has Technical Vocational School in Stavanger where the employees can build a career and educate themselves to a higher level than they already are. Many employees want to work after graduation, rather than being a student. Most of the employees are specialized in mechanics and when they want to study, they can either go to the vocational school in Bergen or in Stavanger, or achieve certificate of apprenticeship. The Westcon supports students with paid days off on their attendance days and exam time, textbooks, equipment, licences, travel and other accommodations (Inside WESTCON, n.d) Each year WPA has focus on taking in young adults as interns in the company (Jensen,S 2020).

The accounting of the company is not available. It can be assumed that the company might be affected by the circumstances of COVID-19, but it is not found that the company has experienced losses or has terminated any employees (2020)

4.2 New development of the firms

This is an introduction of the firms this master thesis will introduce. All the five firms are connected to the oil field. Aarbakke specialises on machines that has the ability to produce any kind of material. Oceaneering and Stinger Technology are firms which are working within underwater technology. It has AUV and ROV technology. The fourth company that will be represented is Mento AS, which is known for developing pipelines that can be used by the oil field. The last company, which will be introduced, is Westcon Group, which works with electric installation onshore and offshore.

4.2.1 Case 1 Aarbakke AS new development

The future plan of Aarbakke AS will be seen when the new fabric is ready to be built in January 2023. It will be as large as 15.000 m² in Bryne and it will be known as Aarbakke innovation. As known, Aarbakke is recognized by CNC-machines. This fabric will have the new computerized welding and turning that can make complicated parts of metal and other materials. These materials are bought from the fabric TechnipFMC outside Bergen.

The pipelines are being used to cover the plug work in the wells. With these new tools Aarbakke Innovation can move the work from one vessel to another. This will reduce the costs to around 30 %. With the new pipelines there will be no risk if the pipelines are not taken out from the wells. The risk will be reduced in regards to the transportation and deposit of the pipelines on land. (Dahl, M 2020)

The oil and gas company has a responsibility to develop permanent plug work in the oil wells. One of the negative effects towards the country is that 78 percent of the cost of the plug materials is paid by taxpayers. That is something the company, Aarbakke AS reacts to and that is why they want to develop a technology that is less costly. (Andersen, 06.2020)

The new technology Aarbakke developed is MTR. MTRs full form is Micro Tube Remover which is an easy intervention tool. With this tool Aarbakke can avoid the use of rigs to complete the task and instead use a vessel that is cheaper to operate. The idea of MTR is to identify where the control lines in the well are and remove them in the section it is needed to plug in. The method that was used before ensured that the wells were sealed and that there was not leakage from the well and up to the seabed, before the well was getting plugged. The

cable that is used is either used as a hydraulic connection that pumped chemicals through the reservoir or it can be electrical wires. This cable is called the control line, and it needs to be removed so that the wells has no leakage and are sealed. This long process has been replaced with MTR tools which are compared to a Swiss Army knife that performs a number of different function that are required to complete the operations. (Andersen, 08.2020)

Aarbakke has a partnership with Wellstrøm, who makes the metal bismuth, instead of traditional cement. Bismuth is the Norwegian name of this metal. The metal material melts in the well and makes a plug when it hardens. The benefit of the metal is that it creates the plug sealed. Bismuth metal is ten times heavier than water and melts at 270 degrees. As it gets cold it hardens. This metal makes sure that it is an effective material that plugs the wells. This is the technology Aarbakke is cooperating with Wellstrøm to develop. This technology reduces the costs, climate gases and gives a higher security (Andersen, 12.2020)

4.2.2 Case 2 Mento AS new development

Mento AS are exploring the wind farms to be a part of the sustainable development. Wind farms has been developed along the North Sea and Baltic coasts of Europe. The largest issue with the installation of the object exposes sea creatures to noise and vibration. These disturbances create trouble for fish as they use sound for orientation and communication. Through Continental, a specialist hydraulic engineering company, it is a generation, called Big Bubble Curtain. It is described by David Hoffman that even before the piles for the wind turbines, which could be as tall as 150 meters, the installation contractor laid one of the heavily perforated hoses in a ring around the site during the construction of a wind farm. This affected the and water, by changing the density and broke down the sound waves. However, this technology reduces the volume by 95 %, which is equal to 18 decibels. Another effective result is that the heavyweight unit can be balanced more effectively at the required depth. (Mento, 2020)

One of the most dangerous effects disturbing the environment is offshore oil spills. For a long time it has not been possible to produce other dimensions when it comes to production and material technology. The engineering specialist in Convention, Michael Möschen, explains that products have a maximum width of 2.000 millimetres, but the new developments are made with a 3.200 mm width to protect the environment (Mento ,2020)

Mento As are collaborating with Houghton Offshore Technology's speciality which are hydraulic and controls fluids that are applied in shelf, deepwater drilling and subsea production. One of the product Houghton stands for is Stack-Magic BOP, which has been at the front since Deepwater drilling began. Stack Magic ECO-Fv2 has delivered a combination of high technical performance which leads environmental compliance. Rig drilling has been supported by BOP. (Mento 2020)

A recent fluid, Hughto-Safe NL1 is developed, and this offers the elevated technical performance required of newer, harder working system. It is called Direct Acting Tensioner system. This system is embraced by advanced corrosion inhibitor and a pH buffering package serves to minimize metal loss and extend the tensioner fluid life. The development of low viscosity 'LV' versions of NL1 and WL1 are available for cold climate use. (Mento.2019)

An aqualink subsea control fluids is developed by Houghton in a sense to provide critical functionality such as mitigation of wear, corrosion and microbial growth. These are called subsea control systems. Houghton's most recommended fluid is Aqualink HT 804F ver2 that could be used in systems at to 160° C. This is more 100% compatible with all competitive control fluid which may be readily used for top-up of existing systems. (Mento, 2019)

Other objects are Rust Veto and Veto AS. Rust Veto are compounds which are applied to compounds to protect its valuable tubular goods and threaded ends from corrosion during storage and transportation. It can be applied globally, such as protection from physical and chemical barrier in its hostile, oxidizing conditions. Moreover, when the customers demand increased, a new product called Rust Veto ENV was developed. This product was developed to protect the inner surface of drilling riser while in storage both onshore and offshore. The important quality by Rust Veto ENV has a low environmental impact formulation used for climactic condition. (MENTO 2019)

4.2.3 Case 3 Oceaneering new development

Autonomous subsea vehicle is a work that needs to be safe as it is growing. The coming generation of remotely operated and autonomous subsea vehicles will make it more safer and lower carbon footprint and the customers requirements (Oceaneering, 2020). This is something Oceaneering is researching on. NOIA Safety in Seas Award recognize specific technologies approaches, methods or projects that improves safety. Last year, 2020 NOIA Safety in Seas Award Oceaneering received the award for their Liberty™ E-ROV. Their Liberty™ E-ROV system is eliminating the need for an ROV support vessel, also associate

employees to be onsite. With the Liberty it has led to a 75 percent of reduction, support vessel, crew support and reduction of 1.400 tons of CO2 emissions (Oceaneering, 17.09.20)

Another product that Oceaneering is working on is Freedom™ Autonomous Subsea Vehicle. The Freedom ROV is a combination of a ROVs speed, range and flexibility of an AUV. It is divided in two parts, either it can remote via a tether or optical through-water communication. Even though it can be a land-based a possibly allowing a land-based a pilot to control the vehicle or fully autonomously with no human interaction. The Freedom platform gives many operational variations; it can also be used as support inspection, particularly pipeline, light invention work and general survey. When it comes to carbon emission, it is reduced because Freedom™ can survive without the support of a vessel that stays nearby. Further, Freedom™ can recognize a problem through the machine vision. It will be strenuously tested at a dedicated facility in Norway. Oceaneering is implementing new technologies to inspect and manage the integrity of the customers assets which will be more efficiently and effectively. Moreover, Compass supervisory control is the software which drives the Freedom ROV. This combined software and vehicle configuration enables to perform more tasks, faster and more safely than before (OCEANEERING)

Renewable energy is one of the focus Oceaneering has had since 2018. A project took place in Northeast Scotland, believing that it would become the largest offshore wind farm in 2019. The wind farm would consist 84 wind turbines and were expected to power about 450 000 homes. The Oceaneering SCAR Seabed System is not only well established, but also highly efficient and an economic method of clearing and preparing the seabed in the first stage of major wind farm construction projects. However, through an acquired survey data has identified significant boulder fields in the wind farm array lay and trench corridors. This was indicated to impact many of the planned cable routes and to perform the cable installation and jet trenching campaign, the boulders had to be removed. (OCEANEERING)

It is shown on the homepage of Oceaneering which is international page, 5 SDG which are

- Goal 3 described as “Whether it is a blood drive in Azerbaijan, a local soccer match in the U.K, a cricketer game in India or the annual Heart Walk Fundraiser in Houston, benefitting the American Heart Association, Oceaneering employees are actively focused on good health and well-being”.

- Goal nr 4 : “Every child deserves a quality education. Oceaneering actively support science, technology, engineering and math (STEM) programs around the world, including the MATE international ROV Competition, NASA in Aberdeen, and other events and interships.
- Goal nr 5 : We are committed to ensuring that no modern slavery or human trafficking occurs in our business or supply chain. Our Oceaneering Women’s Network offers networking and career enrichment opportunities to help women and men achieve their full career potential
- Goal 7 “ we are committed to the research and development to the research and development of products and services that enable our clients to produce energy safely and securely, with decreased risk to both humans and sea life, and create a lower cost of ownership.
- Goal 10 We heavily invest in the countries in which we operate to provide local workforce training that includes practical workshops, simulators and other online programs. We are also committed to closing the gender pay gap and reporting our progress.
- Goal 14 We are committed to reducing marine pollution. Our newbuild MSV Ocean Evolution is an ecologically-friendly subsea construction vessel, holding an Green passport, equipped with low-emission EPA Tier 4 diesel engines.

4.2.4 Case 4 Stinger Technology AS new technology

For Stinger it is important to keep on growing in innovative subsea technology and service company that offers robotic underwater solutions. They are attentive on intervention, maintaining and repairing (IMR) service for energy, telecom, mining, aquaculture and renewables markets as Stinger’s technology will provide unprecedented value for these customers. The companies goal is to become the important of light weight, smart and fast deployable underwater drones for resident applications with semi-autonomous and autonomous characteristics. Their service is specified within necessary data and manipulation capability to support maximizing production and improving asset value while minimizing their operating footprint, operating cost, carbon footprint, offshore operating footprint and offshore HSE exposure. A tool called HMI is a new part of S.T

S.T have goals they are committed to. They will pursue the goal of zero harm to environment, material assets and people, use active risk management to mitigate of foreseeable hazards. They want to make sure health, safety, environment, quality and security (HSEQS) is integral through their construction, design, operation, maintenance and disposal of our assets and services. For person's duties and responsibility, the company provides information, instruction and training. (Stinger Technology,2021)

4.2.4.1 What is HMI

HMI stands for Houston Mechatronics Inc and develop an ecosystem of cloud based on sea robots, software and subsea services delivered in a modern business model to the offshore industry. The products HMI offers is Aquanaut, its Dept. of Defense counterpart, suite of hardware and software to update existing ROVs. The robotic system of HMI robotic systems are delivered to customers, such as commercial and Department of Defence (DoD) customers through a Robotics as a Service (RaaS) subscription business model. Their services make sure that their customers the necessary data and support maximizing production and improving asset value while minimizing operating footprint, operating cost, carbon footprint and offshore exposure. Houston Mechatronics. (n.d.).

In 2021 has settled an agreement between Stinger and HMI. The Norwegian Oil & Gas market will have Aquanaut and all the necessities they need to target and execute inspection, repair and maintain operation in the field. These materials will be provided by HMI and further Stinger will add Aquanaut capabilities to its existing IRM service business. It is assumed that this partnership will bring solution and satisfy customers. Aquanaut will also be a finalizing product that is qualified to be ready for commercial application in Norway within next year, 2022. The CEO, Bjarte Langeland thinks that the HMI Aquanaut technology for Underwater Intervention Drones in Norway will help the industry in regards to creating their own robots/drones. Also this collaboration Stinger will be able to offer their customers a wider product range. (Stinger 2021)

S.T got a contract with Equinor in 2020. The contract is to conduct an underwater inspection with a small underwater drone that S.T will develop on Equinor's Norwegian shelf. S.T will also execute inspections at fields such as Johan Sverdrup, Sleipner, Statfjord, Gudrun, Draupner and Gina Krog. The new product they will use has the name ARROV, where a stands for autonomous and the r stands for resident. ARROV is described as an. autonomous vessel. The company developed two version of it, the smallest one is 40 cm in long, 30 cm

wide and 25 cm high. The second is the largest with a length at 75 cm, wide at 64 cm and 30 cm high. Usually the ROV get pushed in a steel tip to make contact with the steel through the paint, but with the new “smart solutions” it includes a hammer solution to get into the steel that can measure it. The company will be a part in a research and development project over two year with the international oil company Neptun Energy. (Ramsdal. R.,2020)

One of the most important purpose for having non-human working on Norwegian Sea is to minimize danger for human life. According to a news article; it’s a fact that working out to the sea can impact on the workers such as; electric-shock, drowning incidents that cause head injuries or by poisoning chemicals. Norway is mostly surrounded by rain during the year and under such environments, especially at nights it gets risky to complete the work. The hypothesis about the aquaculture is believed to be fivefold by 2050 and the work would be moved further to the sea and the human life would be at risk. The climate change in the coming year will make the work more difficult. Autonomy vessels will reduce the manual workload and expand the safety of the facility. (Sund.S., 2016)

4.2.5 Case 5 WPA new development

As mention WPA has decided to concentrate on the zero emission of vessels. It has shown result for the company. In 2020 the company started to deliver battery systems to world’s first electric ship, and at the same time they are expecting more “green based contracts” coming in the future. The battery package corresponds to 40 Tesla cars and is one of the innovative solution where WPAs solution contributes to reduce emissions. (Westcon Power 27.01.2020) The vessel is an electric catamaran which is mute and emissions free. This ship will be in Lysefjorden among the cruisetrafficks. Along with power and automation systems developed and designed on Karmøy, the diesel use and other emission be a correspond cut to 270 000 litre per year. WPA believe that this technology and their solution will bring the vessels forward (Westcon Power 27.01.2020)

The technology is developed on the level that WPA’s batteries systems that the ships can be on high speed and keep long distance than before. These are the two most important keys that the electric is driven as far as now today. However, the climate change is one of the largest challenges the world is facing, WPA has shown how green technology is a profitable part of the solution. In 2019 WPA turnover shows half million Krone, where about 70 percent of the production was connected towards green technology. The company is assuring battery and

control system for turisboats, such as “Future of the Fords”, “Ship of the year” and “viking Energy” . “Viking Energy is made into battery hybrid drive as worlds first ship approved as DP-operasjon. Further WPA will be on the activity of worlds first hydro ship that will be delivered in 2021 (Westcon Power 27.01.2020)

4.3 SWOT Analyse of the companies

4.3. 1 SWOT analyse of Aarbakke AS

Strength	Weakness
<ul style="list-style-type: none"> - Cover customer needs - Innovative - MTR - New technology 	<ul style="list-style-type: none"> - Dependent on materials from Italy
Opportunities	Threats
<ul style="list-style-type: none"> - Gets steel from Bryne in equal qualities - Apprentice 	<ul style="list-style-type: none"> - Oil crisis - Malm Orstad

Cover customer needs: The aim of Aarbakke AS is to produce product as the customer demands. This is a capability new customer also will appreciate whenever it comes in new demands.

Innovative : Aarbakke is making innovative products which is an important strength as they will be considered as competitive

MTR : This is a tool, which is used can be avoided by the rig to complete the task and control the lines in the well is and remove them in the section where it is needed to be plugged.

Receive material from Italy : Aarbakke can use the same type of material from Bryne as from Italy. This is a weakness of strategy as receiving materials from Italy can take time.

Gets steel from Bryne in equal qualities : the materials from Bryne is nearby the company, which do not take much delivery time.

Oil price : during the downfall of oil price 2016, the company has a tough time. the company is worried about to get more damage of the downfall in near future.

Covid-19 : The company had to take welders from England during the quarantine time.

Malm Orstad : specialization in mechanical and hydraulic product connected to oil and gas industry. They are learning to work with Mazak-machines.

Wellstrøm : The company Wellstrøm has made metal bismuth which is an effective material that plugs the wells. The material reduces the cost, climate, gas and gives higher security. That's why partnership with Wellstrøm is the strength side of Aarbakke

Apprentice : Taking apprentice in the company helps youngster to get experience and be a part of the community and having apprentice gives the company

4.3.2 SWOT analyse of Case 3 Mento AS

Strength	Weakness
<ul style="list-style-type: none"> - Cover customer needs - Sustainable development - Oil Price - "Mentoskolen" and leadership program 	<ul style="list-style-type: none"> - No founding about weakness
Opportunities	Threats
<ul style="list-style-type: none"> - North Sea and Baltic Europe 	

Cover customer needs : Mento AS produce as customer demands. Mento AS has a low-volum production, which shows that they do not have waste in the production.

Sustianable development : the company has focus on sustainable development which is a part of sustainable development goals.

Mentoskolen and leadership program : Through this the employees can increase their knowledge and develop their personal skills.

No founding about weakness: it is no information about weakness. The most common way to find about the weakness is to interact with the company, which is not prioritized in this part

Norh Sea and Baltic Europe : Mento AS has opportunities to work towards where they are building windmills.

4.3.3 SWOT analyse of Case 3 Oceaneering

Strength	Weakness
<ul style="list-style-type: none"> - Produce on the behalf of customer needs - Innovative - Sustainable development 	<ul style="list-style-type: none"> - Oil and gas
Opportunities	Threats
<ul style="list-style-type: none"> - Renewable energy 	<ul style="list-style-type: none"> - Competitors - Terminate

Produce on the behalf of customer needs: the company is producing product when they receive a demand from customer. in this sense they avoid waste of material, time and workload.

Innovative : Oceaneering has focus on ROV and AUV technology to be at front for their customer.

Sustainable development: According to Oceaneering website they are supporting the UNSG with having focus on equality, education in Oceaneering, Oceaneering also work within research and development.

Oil and gas : Oceaneering is demanded on oil and gas industry. If oil and gas industry has high demand of products, Oceaneering has high production. When oil and gas industry have low or no demand of products, Oceaneering has low or no productions.

Renewable energy : As oil and gas industry is focusing on being renewable energy, ocean engineering can focus on mineral extraction. They are currently working on offshore windmills.

Competitor : through founding it came forward three competitor that is relevant for this company named by IKM Subsea, Subsea7 and Deep Ocean AS.

IKM Subsea is a Norwegian company which has the headquarter at Bryne. They also have customer as Equinor. IKM subsea also have knowledge and deals within the ROVs technology.

Subsea7 is located at Forus and work on mission as small and large Integrity maintenance repair (IMR). IMR is used for inspection and repairment of seabed equipment and pipelines.

DeepOcean AS is located in Haugesund and deliver high qualification in innovative services for Subsea markets. The company is specialized in inspection, reparation, IMR, Subsea installation and removal. They also have 36 ROVs and 2 AUVs.

Terminate : young people has been terminatet because of lesser project in the company, this can become a threat as they are not able to connect with new talent under this situation. As young people has been terminated twice it is difficult to have them return after the situation gets better.

4.3.4 SWOT of analyse Case 4 Stinger Technology

Strength	Weakness
<ul style="list-style-type: none"> - Sustainable development - Easy and costless underwater systems - Offshore Technical School 	<ul style="list-style-type: none"> - No findings
Opportunities	Threats
<ul style="list-style-type: none"> - Location 	<ul style="list-style-type: none"> - Oil price

Sustainable development : As being innovated within the product development, S.T is focused on avoiding person injuries, damage of nature and environment

Location : S.T is location between Tasta and Bjergsta. Near this location lies Stavanger where they easy can access to Offshore Technical School

Offshore Technical school : This school gives S.T access to a quay accredited to the international ISPS-code of ship mobilization and mechanical garage nearby, test of the underwater technology they are developing to secure it against leaks. Company providing information, instruction and training: They want to provide this to the employees, this shows that they prioritize education and learning.

Easy and costless underwater systems : S.T want to be known as developing easy and costless underwater systems in oil and gas industry. The firm is focused design and production of the product launching to the customer. S.T is keeping the low budget in that sense that they develops products on customers demand. Instead of human work they are using ROV as a solution to avoid human damage in underwater projects. Also the material damages is at low risk.

Oil price :Under the oil crise in 2015, when the oil price was falling down, it effected Stinger Technology. This is a threat which can not be avoided as they are demanded on oil and gas industries.

No findings : it is difficult to discover what the weakness of S.T is, but this does not mean that the company has none. There might be internal disagreement in the company which are disclose in the public.

4.3.5 SWOT analyse of Case 5 Westcon company

Strength	Weakness
- Innovative	- No findings
Opportunities	Threats
- Technical Vocational School - Has supporter for its projects	- Akva group ASA

Innovative : WPA is known for being innovative within products the customer demands and they avoid overproduction

Technical Vocational School : WPA gives opportunities to their employees who have mechanical educational and they are given education at a higher level. The employees can become engineers and the company supports students with paid days off when the employees need attendance at school and on exam days.

Supporter for the project: the projects WPA works on have been supported by Equinor, Demo2000, Shell and Conoco Phillips.

Akva Group ASA : They deliver similar kind of service like WPA. They also focus on being sustainable in development on the environment at land and sea. As Norwegian companies demands their partners to deliver product and service on sustainable level, it is important for WPA to be competent in contrast to their competitor.

CHAPTER 5 DISCUSSION This chapter will show a combination between theories and research questions

5.1 Common goal between the companies

It has not been mentioned clearly by the companies which UN goals they are working towards, but through their development it can be classified what goals they are working on. Through these cases it is found a common SDG, which is goal nr 9 called “innovation”. According to John and Bessant innovation (2014) is presented as change, or more specific transforming ideas into something valuable (2014)

5.1.1 Case 1 Aarbakke and UN goals

Aarbakke developed a technique from horseshoe production to deliver production in the oil and gas industry. As mentioned, Aarbakke opened a fabric in China, but the customers were in favour of having the production local, like in Bryne. Having the production in Aarbakke AS in Bryne, leads to opportunities of higher economic productivity and innovation. This work way it showed under target 8.2

Aarbakke has a mission to have zero occupational injuries through secure and safe and good work. The subgoal which is attached to this, is parts of 8.8 which is protecting labour rights and securing working environment for their workers, since it does not have any information on any migrants working in the company.

The employees in the company have also agreed on protecting the environment, follow up the CO₂ emission and improve the environments. This mission shows in goal nr 12, consumption and production, subgoal 12.7 and 13.3. subgoal 12.7 describes that the goal is to achieve being sustainable through the use of natural resource and subgoal 13.3 mention how each person should have the intention to achieve the CO₂ emission which is about the climate change

Aarbakke has partnership with Scan Tech towards given service to oil and gas industry. Aarbakke also partnerships with Controlcutter. Scan Tech and Controlcutter are engaged to work with Aarbakke according to what their performances have been. The SDG comes under 17.17, Aarbakke is a private firm that has developed partnership with oil and gas industries

Overall the company stands for innovation products and services. The UN goal 9 industry, innovation and infrastructure is a goal that is characterised of the company. Aarbakke has also developed the MTR, which is a Micro Tube Remover They are depended on customers

demand. The new area called Aarbakke Innovation is making technology which will reduce the cost of plug material, shows that Aarbakke is considerate to the environment and taxpayers which are paying the cost of materials. This innovation also comes under sub goals of SDG 9.1 and 9.4

To sum up Aarbakke is working in the three dimensions. Aarbakke works with economic sustainability when it comes to subgoals 7 9.1, 9,4 and 12.7. The subgoal 13.3 comes under the second dimension, environmental sustainability and social sustainability which again lays under 17.17.

5.1.2 Case 2 Mento AS and SDG

The Mento Oil Field Service. A family business developed from delivering goods and service to oil industries, to making new mechanical solution for the oil platforms. They have their own program for leadership development and school “Mentoskolen” where their employees can increase their knowledge and develop their skills, this is related to 4.3 and 4.4. They are focusing on suitability, therefore the subgoals 9.4 fits to their innovation method. Further, Mento AS has future plan of doing search for oil at the Norwegian continental shelf. The subgoals Mento AS is working on at this point is subgoal 8.2 where innovation and new technology is being developed to achieve productivity.

Mento As is also according to their website following their aim in production, is to use secure and sustainable materials and minimize the waste. This work method can be understood by subgoal 12.4 and subgoal 12.6. Mento AS and Houghton Offshore Technology together delivered combination of technical performance that leads environmental compliance. This subgoal is about partnership and the subgoal 17.6 and 17.7 are directed to developing countries, but in this company Mento AS is working with other companies to acknowledge new technology, partly work of 17.6 and 17.7 is being partly executed. The company is also heading the focus on windmills which comes under clean energy, where this work method comes under 7.2, 7.3 and 7a.

Mento AS holds the goal that goes under three dimensions. Social sustainability which has SDG 7.2, 7.3, 7a, 9.4 and 8.2. The other dimension is economic sustainability which are related to subgoal 12.4, 12.6, 17.6 and 17.7

5.1.3 Case 3 Oceaneering and SDG

Oceaneering International was established on Norwegian offshore in 1973. Oceaneering specialize in innovation to succeed in the market. It has been mention that Oceaneering is working towards UN's sustainability goals. The company works towards having equality, human right, education and avoid slavery. This subgoal comes under 8.2, 8.4 and 8.7. The company is working towards reduction of CO₂ emission and developing new ROV systems. They have developed Freedom™, which reduces carbon emission.

Oceaneering is also developing windmills to make the energy cheaper in Northeast Scotland, this is connected to subgoal 7.2 and 7a). Moreover, the focus on innovation involves subgoals 9.2 and 9.3. Talking about the learning process at the workplace involves subgoal 4.3, 4.4 and 4.7. Other goal that are relevant for this company, as the Oceaneering claims are goal 3, 5, 7, 10 and 14. As they have described goal 3 is described to be actively focused on good health and well being, the subgoal which are more relatable is 3.d. The company is also ensuring modern slavery or human trafficking and also they have Women's network that offers networking and career by helping both man and women, this is related to the subgoal 5.1, 5.b and 5c.

The goal 7 "affordable and clean energy" is described by Oceaneering as they are committed to R&D, produce energy safety and securely. They are related to the subgoal 7.1 , 7.2 and 7a. Goal 10, "reducing inequality within and among countries" Oceaneering tells that they invest in countries where Oceaneering operates to provide local workforce that includes practical workshops, simulators and other online programs, these goal Oceaneering is investing time comes under subgoal 10.3 and 10.4. The last goal 14 " quality education " the Oceaneering has committed to reduce marine pollution, MSV Ocean Evolution is an ecologically-friendly subsea construction vessel which is connected to the subgoal 14.1 and 14.2.

The product AUV and ROV secure the human work and the human is not on any danger as the work is being done on the land, while the product is on the seabed. This is what is described as autonomy work.

The dimensions which Case company 3 is involved is economic sustainability (8.2,8.4, 8.7, 7.2 ,7a, 9.2 and 9.3). The company also has goals that are related to social sustainability as for

goal 4.3, 4.4 and 4.7. They are supporting the SDG 4. Oceanering is supporting goals 3,10 and 14 that comes under dimension environment sustainability.

5.1.4 Case 4 S.T and SDG

S.T AS focuses on innovation and considers it important to be the customers' first choice such as Equinor, Kawasaki Heavy Industries Ltd and Neptun Energy. They deliver as the customer demands, which avoids waste. The company also focuses on eliminate damage on materials, nature and environment. It has a large focus on person injuries during worktime. This goes under the goal 9, innovation. The subgoal relates to 9.4 and 9.5 as it focus on being innovated in research and development in technology. They also focus on taking care of the nature and environment, which relates to subgoal 13.2. Another approach the company wants is to minimize the operating costs, carbon footprint, offshore operating footprint and Offshore HSE exposure by using the new software HMI. The company also has the facilities to provide information, instruction and training and these facilities comes under 4.3 and 4.4, the company has not clearly said it is a goal they will reach by 2030, but they are currently giving opportunity to give information, instruction and training.

The Case 4 is involved in two of the dimension, economic sustainability (7a, 9.4 and 9.5) and environmental sustainability which is 13.2. Like Case 3, Case 4 has product like AUV and ROV which is considered as autonomy. S.T has also developed ARROV which includes a hammer solution to get into the steel and measure through the cables under sea.

5.1.5 Case 5 Westcon AS and SDG

WPA is focusing on being a part of the green environment, sustainable development and innovation of electric systems and automation. The kind of innovation Westcon AS is doing is related to 9.4. The company has partnership with Norled to build the worlds first hydrogen vessels which is currently under production. The WPA partnership can be related to subgoal 17.16 and 17.17. Working towards a better sustainable use and production can be related under the subgoal 8.4. The employees in WPA has been given the opportunity to study at the Technical Vocational School if they want to develop their knowledge and receive a certificate of apprenticeship. This goal comes under subgoal 4.4 which is about getting a significant increase in the number of young people and adults who have competence, including in

technical subjects and vocational subjects, which are relevant for employment, decent work and entrepreneurship

The case company 5 is related to two dimensions. The economic sustainability has subgoal 8.4 and 9.4. The 17.16, 17.17 and 4.4 comes under environmental sustainability

To make it clearer which subgoal the SDG is related to, it is described in the table below. It shows that Case companies are related to the subgoals of SDG 9 and SDG 7

	CASE 1	CASE 2	CASE 3	CASE 4	CASE 5
<i>SDG 1</i>					
<i>SDG 2</i>					
<i>SDG 3</i>			X		
<i>SDG 4</i>	X	X	X	X	X
<i>SDG 5</i>			X		
<i>SDG 6</i>					
<i>SDG 7</i>			X	X	
<i>SDG 8</i>	X	X	X		X
<i>SDG 9</i>	X	X	X	X	X
<i>SDG 10</i>			X		
<i>SDG 11</i>					
<i>SDG 12</i>	X				
<i>SDG13</i>	X	X		X	
<i>SDG 14</i>					
<i>SDG 15</i>					
<i>SDG 16</i>					
<i>SDG 17</i>			X		X

5.2 Companies cases and innovation

5.2.1 Case 1 Aarbakke AS and innovation

Aarbakke AS has developed a Micro Tube Remover which makes it more easier and more cheap to operate. The process was developed as Aarbakke reacted that the production cost burden was on taxpayer. Therefore Aarbakke wanted to give the taxpayer a relive. Aarbakke is also using metal bismuth rather than cement and is more effective. This type of technology reduces the cost and risk. Innovation is done through research and development, which makes the product less costly.

5.2.2 Case 2 Mento AS and innovation

Mento AS has developed technology that does not damage the environment at Offshore oil spills. The products has an maximum width of 3200 mm instead of the old which has maximum of 2.000 mm. Other products, like Hughto-Safe NL1 is used for newer, harder working systems and aqualink subsea control fluids provides critical functionality as mitigation of wear, corrosion and microbial growth. The las product Rust Veto and Rust Veto 14 that protects hostile, oxidizing conditions and wide range of proved products. Also another product Rust Veto ENV gives a low environmental for use in extreme climactic condition. This innovation is created by mechanics who are doing research and development.

5.2.3 Case 3 Oceaneering and innovation

Oceaneering new technology in Freedom ROV that are able to perform more tasks, faster and more safely. The wind farm, Oceaneering SCAR System that are able to clean and establish the seabed. Oceaneering has through technology reduced 1.400 tons of CO2 emissions through their new developed technology Liberty™ E-ROV system.

5.2.4 Case 4 Stinger Technology and innovation

The company is developing new product for energy, telecom, mining, aquaculture and renewables market. S.T is taking the tool HME which is a robotic system that minimize the operating footprint, cost, carbon footprint and offshore exposure. They believe the autonomous is the future of technology. This is a part of project in research and development. The article of written on TU supports this way of thinking that autonomy vessels reduce the risk and damage of human life

5.2.5 Case 5 WPA and innovation

WPA has developed zero-emission vessels and are delivers battery systems to first electrical speedboat. Vessel has an electric catamaran which is mute and emission free. The green technology has been profitable for the company. The battery system saves the environment that ships can be on high speed and longer distance. The battery package has been corresponded to 40 Tesla cars and the battery is deliver to world's first electric ship,

CHAPTER 6 VALIDATION - This chapter will describe the work way that is chosen for this thesis

For this master thesis it has been used information done by students from bachelor in economic and administration. Each group of students has been given different companies to write about. The information used for this thesis is from a third person, where they have found the information, they needed from the internet without interacting with the given companies. Moreover, while using partly information done by the student. It has been used information from newspaper online and the companies' website. The information written in newspaper has been written from a third person perspective. For own newspaper, the author would only write limited information that is given by the company's manager. The information from the manager of the future plans comes out when the manager is about to launch a new model in few months. It is not necessary for the company to tell people outside the company what and how they are planning to launch new product.

The aim of the company to hide the information is not to be copied or not be able to be a step forward in competition and in the market. I have not been able to find the exact threats and weakness of the company. This has not been possible as I have not interacted with the companies face to face. Again, it is not usual for companies to reveal their threats or weakness in front of a master student. The information of the companies on the website is increasing with new information, that is why it has been important to put an end of new information of the company after chapter 4.

The difficult part was to find suitable goal for each company. It has been a challenge as some of the subgoal such as goal 17 is based on developing countries, but somehow the work method of the company can be seen suitable under goal 17

CHAPTER 7 CONCLUSION – this will answer the research questions

The UN SDG has been described in three dimensions, one is economic sustainability, social sustainability and environmental sustainability. The first dimension, economic sustainability includes goals 7,8,9,11 and 12. Under second dimension social sustainability, goal 1,2,3,4,5,10,16 and 17 are included and environmental sustainability has goals 6,13, 15 and 14 (Dharhri et al. 2020)

The goal of this thesis is Case companies work towards innovation and UNSD goal and to find the answer two research questions have to be answer. The first research question is *which SDGs are relevant for the case companies?*

Some of the case companies are clearly telling the world through their website which goal they are working in the direction of, such as Oceaneering. The others are not mentioning which specific goal they are working in contrast of, but the case companies clearly are working with developing new products that are sustainable, less costly and do not damage the environment. Mention by William Schramade (2017) that it depends on the investor's goal which SDG should be invested by the company. These Case companies are also taking choices to invest in the different subgoals from SDG. The first case company Aarbakke are related to the subgoal of the SDG 4,8,9, 10, 12 and 13. Case company 2 Mento AS have subgoal under the SDG 4,8,9 and 13. Case company 3 Oceaneering has subgoal that comes under SDG 3,4,5,7,8,9,10 and 17. Case company 4 has subgoal related to SDG 4,7, 9 and 13. The last company WPA have subgoal that is found under SDG 4,8,9 and 17. It is discover that all the case companies is related to subgoal under SDG 4 and 9.

The second research question is related to innovation. *What is the innovation in the case companies?*

All the activities which are included when innovating and introducing new products and services, is called research and development (R&D).

Tidd, J., & Bessant, J. (2014) describes innovation as creating value. That value is created in product or services. To create the product it need to be transferred through different kinds of products which is called R&D. Every case company are related to innovation. It is found out that each company are producing product and services as the customer demands it. The

companies are working on developing the products, services and doing research and development to increase their variation in innovation. Variation in that sense that the companies produce product that do not damage the environment and helps the CO₂ emission. Another common thing the case have is to make product the customer demand, they do not make the product and look for a marked. This relates that they avoid wasting time, energy and resources.

Innovation in Case Company 1 Aarbakke are : (MTR), Bismuth metal and advantage use of CNC.

Innovation in Case Company 2 Mento AS are : Hughto-Safe NL1, Rust Veto, Rust Veto 14 that and product Rust Veto ENV

Innovation in Case company 3 Oceaneering are : New technology in Freedom ROV and Liberty™ E-ROV.

Innovation in Case Company 4 S.T : ROV, AUV, ARROV, HMI

Innovation in Case Company 5 WPA : Deliver the largest battery to world's first electric ship.

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