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Potential of Circular Economy Business Models - Focusing on the characteristics of the Value Proposition Design

Case: Norway Royal Salmon & Norwegian Fishfarming Technologies

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Potential of Circular Economy Business Models - Focusing on the characteristics of the Value Proposition Design

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Master of Science in Globalization and Sustainable Development
Submission date: June 2019
Supervisor: John Eilif Hermansen

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PROBLEM DESCRIPTION

To understand the Circular Economy Business Model and its value creation, proposition and delivery, and capture methods and its short-term impact on the environment and on sustainability, just as the long-term impacts on the future of our society, its societal and environmental impact, the health of the biological ecosystem we need to have an overview of the ongoing changes and processes to analyse them.

Main contents:

- A literature review on materials related to circular economy, sustainability, sustainable and circular business models and their value creation
- Overview of the circular business models and its possible impact and connection of the sustainability
- Value proposition of Circular Economy Business Models
- Demonstrative case studies on the remodelled Value Proposition Design – Norway Royal Salmon and Norwegian Fishfarming Technologies
- Discussion

Assignment given: 15 January 2019
Supervisor: John Eilif Hermansen

PREFACE

This document is my Master's Thesis in MSc Globalization and Sustainable Development at the Department of Industrial Economics and Technology Management at the Norwegian University of Science and Technology (NTNU) in Trondheim, Norway. The thesis is written with the valuable input of Norway Royal Salmon and Norwegian Fishfarming Technologies.

I would like to thank my supervisor John Eilif Hermansen for his support on my master thesis, for his motivation, knowledge and patience. Our multiple meetings and his guidance helped me along the way to finalize the writing. I would like to thank Haley Knudson for her valuable input and knowledge in critical times.

I wish to thank Ola Loe, the CFO at Norway Royal Salmon for his value feedback and contributions and to Kari Johanne Kihle Attramadal, the Head of Research and Development at Norwegian Fishfarming Technologies for her help, patience and knowledge.

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SUMMARY

Sustainable, environmentally friendly and circular way of thinking in aquaculture is essential to meet the Sustainable Development Goals (SDGs) and challenges linked to global food production, growing population, endangered and fragile ecosystem and climate change.

Developing and trying to adopt such ideas and theories as circular economy and circular business model could help to achieve the SDGs and build a better future for the next generations. Different ways of running a business and creating value has emerged among the different industries and in the aquaculture industry too. This trend could be seen in Norway as well, where traditional businesses are trying to become more sustainable, environmentally friendly, and socially responsible.

Salmon farming as one of the largest industries in Norway has a significant impact on the Norwegian economy. Aquaculture plays an essential part in the global food system, because of the seafood and because of the role of seas in the ecosystem. The country is a pioneer in the sector worldwide. That is why it is important, how they approach the production and how they define their values or work through the supply chain. If the Norwegian companies develop standards and work towards more sustainable solutions, the competitors must work on their own sustainability as well and they could contribute to a greater purpose, called circular economy.

Circular economy is one of those concepts that could help to slow the climate crisis down and develop new solutions to slowly accommodate to the new circumstances posed by climate change related challenges. Circular Economy would turn goods and products that are at the end of their service life into resources, while closing loops in industrial ecosystems and minimizing waste. (Stahel, 2016) Circular economy is about closing loops, reusing what we have and producing goods in a more conscious and sustainable way, where lifecycle of the produced good is known. In some sense and understandings, circular economy could be the endgame of achieving the Sustainable Development Goals. SDGs could play a significant part in the transformation from linear economy towards circular. Every goal has a different approach how to sustain life on Earth and how to make everyone equal in every sense of the term. However, these goals are diverse and in some cases too general to personalize them for businesses. Circular Economy Business Models (CEBMs) can break the vicious circle of prioritizing immediate needs over long-term considerations in poverty that can cause environmental degradation, leading to reduced income opportunities, increased poverty and vulnerability. (Lüdeke-Freund, Gold, & Bocken, 2019)

The aim of this study is to develop a Value Proposition Design for Circular Economy Business Models and to present if this is necessary to have a new value proposition design after a transition from a traditional business model to a circular one or not. The study tries to illustrate its results through two demonstrative case studies of Norway Royal Salmon and Norwegian Fishfarming Technologies and they show what kind of challenges appear in primary industries from the perspective of circular economy and in the terms of value proposition design.

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Anthropocene: Term used by scientists to name new ecological epoch characterized by significant changes in the Earth's atmosphere, biosphere and hydrosphere due primarily to human activities. (UNEP, 2019)

Aquaculture: The farming process of aquatic organisms such as fish, shellfish and/or aquatic plans. Cultured species, cultured environments, cultured technologies, scale of operations and culture objectives can define it. (FAO et al., 2016)

Bottom-up: From the lowest level of the hierarchy up to the top. (UNEP, 2019)

Circular Economy: The concept core is developing cyclical flows in the 4R framework (reduce, reuse, recycle and recover) with other principles like waste hierarchy and systems perspective while narrowing, slowing down and closing the resource flows. (Elaborated in the study) (Kirchherr, Reike, & Hekkert, 2017)

Climate change: A change of a climate that is attributed directly or indirectly to human activities that alters the composition of the global atmosphere and bring changes in temperature for example. (UNEP, 2019)

Earth System: A complex social-environmental system that is interacting physical, chemical, biological and social components and processes to understand and determine the state and the evolution of the planet and the life on the planet. (UNEP, 2019)

Environment: The natural or built circumstances where different stakeholders and actors, live, operate and work. In this study, it mostly refers to the business environment. (UNEP, 2019)

Food security: Economic and physical access to food that meets the dietary needs of people and their preferences too. (UNEP, 2019)

Social ecological system: Complex and adaptive systems composed of many diverse human and non-human actors or entities interact. They adopt changes and the environment adopts changes as a reaction to that. (UNEP, 2019)

Social network: Social structure of set of actors and the ties between them, such as relationships, connections and interactions. (UNEP, 2019)

Transitions: Systemic, non-linear and fundamental changes of the composition and functioning of a societal system with changes in practices, cultures and structures. (UNEP, 2019)

Value chain: Overall product flow from supplier to consumer. (FAO et al., 2016)

Value chain segment: fraction of the product flow chain. For example, customer segment. (FAO et al., 2016)

Value Proposition Design: The concept is about the customer but it gives information for the company about what should it provide to the customer's life. (Lindič & Marques da Silva, 2011) (Elaborated in the study)

ACRONYMS AND ABBREVATIONS

B2B	Business-to- Business
BM	Business Models
CEBM	Circular Economy Business Models
CE	Circular Economy
CoC	Code of Conduct
CSR	Corporate Social Responsibility
EEA	European Economic Area
EMF	Ellen MacArthur Foundation
EPR	Extended Producer Responsibility
ES	Earth System
EU	European Union
FAO	Food and Agriculture Organization of United Nations
GLOBAL G.A.P.	Global Good Agriculture Practices
GSI	The Global Salmon Initiative
HSE	Health, Safety and Environment
LCA	Life Cycle Assessment
NGO	Non-Governmental Organization
NOFITECH	Norwegian Fishfarming Technologies
NRS	Norway Royal Salmon
OECD	The Organisation for Economic Cooperation and Development
PB	Planetary Boundaries
PLC	Product Life Cycle
RAS	Recirculating Aquaculture System
SBM	Sustainable Business Models
SCM	Supply Chain Management
SDGs	Sustainable Development Goals
SWOT	Strength – Weakness – Opportunities - Threats
UNEP	United Nations Environmental Programme
WEP	World Economic Forum
WHO	World Health Organization
WTO	World Trade Organization

"A crucial constituent in the achievement of a circular economy is business model innovation. However, the academic literature on sustainable business models is still in its early days and pays very little attention to circular business models."(De Angelis, 2018)

1 INTRODUCTION

The purpose of this study is to understand the connection between different business models and their value proposition and to be able to understand circular economy business models, their value proposition, and its possible effect on the local community.
In addition to that, the study tries to evaluate how each business model element is changing in the circular economy business model and how this effects on the value proposition. How the elements of the business model (value creation, value proposition and delivery, value capture) change and how the change from linear business model to circular could affect the market, the after-sales service, the research and development, the human resources development and the corporate infrastructure and how having circular economy business model can create a competitive advantage.

Aquaculture is a significant source of employment for millions of people, especially for those living in rural communities in inland or at coastal areas with limited options of employment. Based on a study from 2016 by Food and Agriculture Organization by United Nations (FAO), the number of people employed in aquaculture is 11 399 294 only in nine (9) analysed low-income countries. In the terms of value chain, the aquaculture's value chain can be considered as buyer-driven and mostly retailers influencing the process of production and distribution of final products representing the buyers. Compared to manufacturing value chains, in aquaculture they may be loosely organized depending on products and services, farming system and technological intensification and the market preferences or the characteristics of the market where the product has been sold. (FAO et al., 2016)

Based on the literature review, a decision has been made to conduct an illustrative case study with two local, Trondheim-based, small-scale businesses. The case is based on their value proposition and value delivery. It was important to analyse small-scale companies because transforming the business ecosystem and start to work towards circularity depends on small-scale businesses. To be able to transform the current way of producing goods and the consumer behaviour depend on the small-scale businesses who are able to make a change and push it forwards to keep producing on this level. The topic has been chosen because local companies can be the biggest partners of the change in the way of thinking and they can have a big impact through the jobs what they offer and how they offer them. The reasoning behind the study is to understand and show how local companies and their business model effects on the local sustainability and the local economy. The study tries to explore the connection between circular economy and sustainability and through this qualitative research understand the necessity of the change in value proposition design in CEBM.

The study tries to develop a Value Proposition Design for Circular Economy Business Models and to reflect on the fact why it is important to rethink the value proposition with the change of the business model.

In the following subchapters, the study tries to explore and introduce the purpose of the research, the main actors, the research questions and the limitations of the thesis.

1.1 Background and the purpose of the research

According to Lüdeke-Freund et al. (2019), transitioning to circular economy requires rethinking the company's supply chain to develop diverse reverse cycles; therefore, companies should change how they create and deliver value.

Circular economy is an emerging concept since different stakeholders started to realize that our planet and its resources are in danger, our resources are finite and the non-renewable energy resources cannot be used endlessly anymore because the planet will not be able to survive. How we live our life now and consuming resources are not sustainable anymore, that is why circular economy can be crucial to achieve change and lead to a more sustainable life conserving the natural resources for the next generation. Using renewable energy and resources that are already in the subsystem is the most important step to sustain the life on this planet. (Korhonen, Honkasalo, & Seppälä, 2018)
Sustainable Development Goals were established in 2015 and the goals have been proposed to be achieved by 2030. Seventeen (17) goals have been set in 2015 based on the previously set Millennium Development Goals (2000). Each set had a 15 years long frame in which different nations and local governments could operate. The achievement is monitored year by year. It is a helpful toolkit for the governments and municipalities to see what changes should be achieved on a national or local level. However, to achieve that, not only policymakers, politicians or governments needed to cooperate, but local communities and companies as well. If companies do not engage in the change, it cannot be fully achieved. Companies take up a big part of the decision-making processes and the producing gross domestic product (GDP).
Other theories are important as well. For example, the effect of globalization cannot be ignored, because without that change cannot be carried out and spread to other communities.

However, Korhonen et al. (2018) developed a figure (Fig. 1), which explains the current situation and problem with the linear economy in the shrinking biological ecosystem, because of the unsustainable resource use and the 'take-make-dispose' attitude. Right now, the ecosystem cannot sustain the growing population in the framework of the existing linear economy. The resources are extracted from the parent system but they are not used or processed in a sustainable way, so they cannot be returned to the parent system once they have been used in the subsystem. This type of use leads to waste, overuse, emission and the shrinkage of the parent system. There is an overwhelming amount of evidence that shows how the linear flow is unsustainable in the terms of all dimensions of sustainable development, such as economic dimension, ecological dimension and social dimension.

According to the article, circular economy has a win-win potential meaning of its contributions to all dimensions of the sustainable development (economic, environmental and social) while it changes the elements of the traditional business models. The idea of circular economy is based on natural ecosystems, the adaptability of it and because of these the utilization of the patterns of the ecosystem in economic cycles by respecting the production rates.

To sum up, linear economy is not sustainable anymore and in the case of conserving our natural resources and to leave a liveable planet of the next generation, companies – one of the most significant contributors of the economy – should change their attitude and aim for a circular economy business model, where the goods can be reused or returned to the parent system without causing harm.

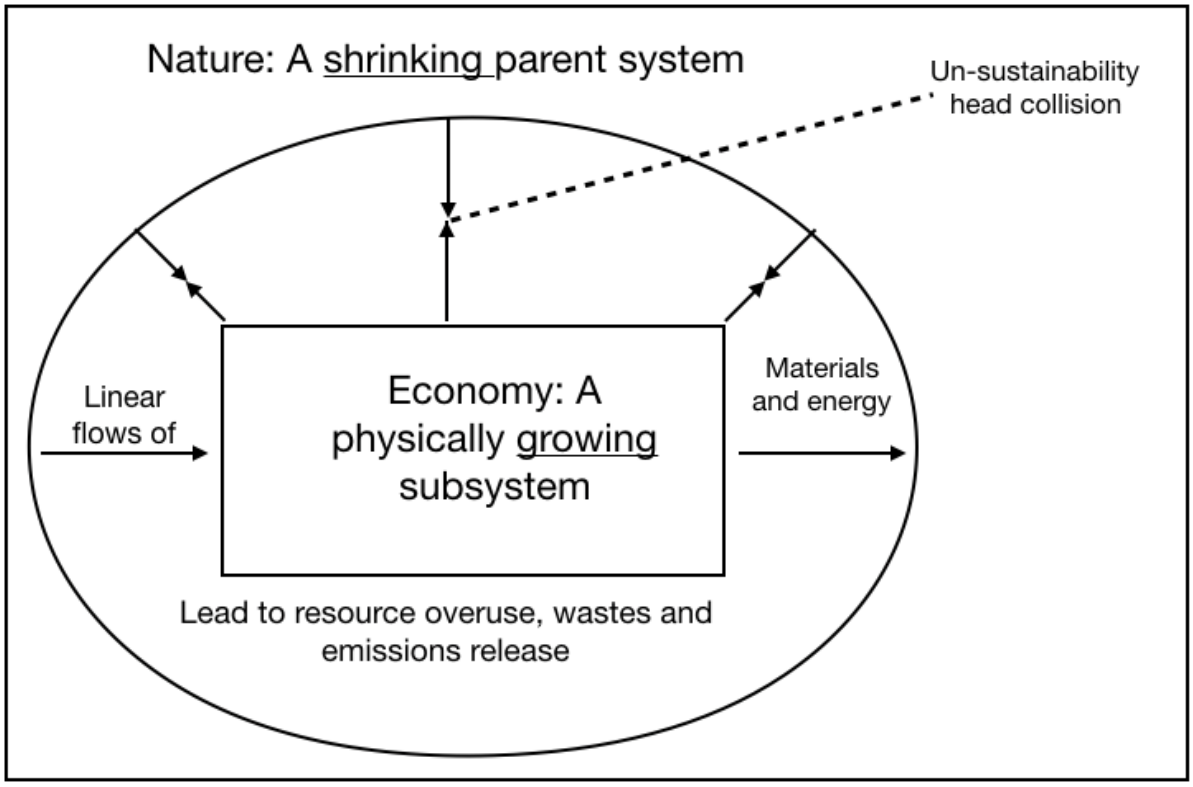


Figure 1.: Linear materials and the growing economical subsystems (Adapted from (Korhonen et al., 2018)

Scope and purpose of the study have different layers.

- Literature review with interdisciplinary approach related to globalisation, climate change, sustainability, circular economy and different business models with the awareness of value creation, value proposition and delivery and value capture in small-scale businesses and corporate social responsibility.
- The study should carry out an illustration with the two case companies, Norway Royal Salmon and Norwegian Fishfarming Technologies in the context of re-modelled Value Proposition Design in Circular Business Models.

- The purpose of the study is to develop a new Value Proposition Design model and analyse if it necessary to change the value proposition model in the case of changing the business model to a more circular one.

1.2 Main actors

There are two main actors and two additional organizations in the study and both are equally important for the construction of the study. One is Norway Royal Salmon (NRS) and the other one is Norwegian Fishfarming Technologies (NOFITECH). The study considers The Global Salmon Initiative (GSI) as an important actor too, because the successful and sustainable company should operate within the framework of the GSI. The Ellen MacArthur Foundation is considered as a significant actor too, because of the pioneer role in the research of circular economy.

1.2.1 Norway Royal Salmon

Norway Royal Salmon (NRS) was founded in 1992 by 34 fish farming companies as a sales and marketing company for farmed salmon according to their website (NRS, 2019). The company took control of Reinhartsen Seafood AS with 90.1% in 1996 and changed its name to NRS Sales AS and at the same time Salmon Invest AS was established too. The company celebrated its 25th birthday in 2017, but they plan to be the most profitable salmon company in Norway.

Among their plans, one of the most important one is the Arctic Offshore Farming that is going to be developed together with Aker Solutions and according to them, it is going to be offshore technology of the future for aquaculture industry.

Meanwhile the company is committed to produce healthy and nutritional food, it tries to support development in rural areas and in the market as well to maintain its reputation. They support young people, children, sports, voluntary organisations and other projects to stay the part of the local community.

1.2.2 Norwegian Fishfarming Technologies

The company, Norwegian Fishfarming Technologies (NOFITECH) develops and builds complete Recirculating Aquaculture System (RAS) land-based facilities. (NOFITECH, 2019)

According to the company's website, their module is the most proven large-scale RAS facility. The first one has been built in 2012, 7 NOFITECH modules has been built so far. With 25 years of operating experience from Norwegian land-based fish farms and 10 years of experience in building RAS facilities. The initial (original) idea was to build a module that is user-friendly, cost-effective and compact.

The module can be expanded, but each model acts like an independent operating unit, so it allows the early start of the business. They are proud of their high-quality module for low price that is space efficient and the construction time is shorter than with other modules, because the company strived to maximise their production with the help of the module. The module is not

just cost-effective and expandable at any stage but it is eco-friendly too. During the RAS process, the water is recycled and the amount of the new water is less than it would be without the RA System. The added water is cleaned before it is released and the energy from the water is recovered in heat exchangers so it is used for heating. Additional to that, to prevent different problems, for example sea lice and different diseases all water comes from deep water, it is UV treated and filtered.
The module is tailor-made which saves construction time and reduces problems what would come from the individual construction. To build the modules they use PVC free pipework and the same concrete what is used for bridge constructions, which is means that the modules are durable and they have a long lifecycle.

Addition to that the modules are safe against escape because of the concrete and the drain has several fish barriers, so smolts or adult fish cannot interact with wild salmon or be the part of the ecosystem.

1.2.3 The Global Salmon Initiative

According to their website (GSI, 2019), it is a leadership initiative by global farmed producers who share the vision of producing healthy and sustainable food to feed the increasing population, while trying to reduce or minimize their environmental footprint and improve social contribution.

Companies from Chile, Norway and Scotland in the urge of improving environmental reputation founded it in 2012. They realized if one company performs, poorly it is going to affect and harm the reputation of all and they can secure greater advantages and economic success by working together to lift the performance of the sector as a whole. (GSI, 2019)

The GSI was launched in August 2013 and now it has 16 members covering eight countries (Australia, Canada, Chile, Faroe Islands, Ireland, New Zealand, Norway, and United Kingdom) and it represents around 50% of the global farmed salmon sector.

The Initiative has three clear principles: improved sustainability, cooperation and transparency. Improved sustainability is about achieving the highest level of environmental and social standards, improving biosecurity, securing sustainable sources of feed ingredients, improving industry transparency and to achieve and to develop different standards working with Benchmark Holdings, Biomar, Cargill, Elanco, Food and Agriculture Organization (FAO) of the United Nations (UN), MSD, Pharmaq, Salmofood, Skretting and World Wildlife Fund (WWF).

Cooperation is about working together with other companies from the same sector or industry and welcoming different stakeholders from their supply chain. Lastly, transparency is about monitoring the change and the still existing gaps and holes in the progress but staying optimistic and working towards the future.

1.2.4 Ellen MacArthur Foundation

Another relevant actor the study used is the Ellen MacArthur Foundation (EMF) and its work and research. The Foundation was launched in 2010 to raise awareness and to accelerate the transitional processes to a more circular economy. (EMF, 2019)

It offers learning possibilities to develop the vision, skills and mind-sets that are needed to achieve circular economy. It emphasises interdisciplinary, project-based and participatory approaches in formal and informal learning. One of their programmed called the Circular Economy 100, it brings together leading corporations, innovators, affiliate networks, government, authorities and actors at every level of the society to build circular capacity, address common barriers to progress and understand the necessary enabling conditions and pilot practices in a collaborative and non-competitive environment.

Additional to the above-mentioned opportunities and actors, the catalysis of circular economy is needed, just as the creation for to reach the scale. Institutions, governments and cities play a big role to develop the necessary environment for the transition, so the foundation works close with these actors to set a global agenda and deliver change on a local level.
Insight and analysis is necessary to monitor the change what the circular economy brings and to monitor the possible ways to capture value. These insights and analysis have a potential to explore the potential benefits across stakeholders and sectors. When it comes to CE systemic vision and systemic initiatives are inevitable, which means bringing together different organisations from across the value chain to tackle systemic problems what cannot be overcame in isolation.

These would not matter, without the effort of communication of the foundation. Without communication, the global audience would not be able to engage in the transition and the acceleration of the transformation would not be possible. To sum up, it has a significant role in spreading ideas.
The contribution and the work of the foundation is important to make CE mainstream instead of talking about it on an academic level without any real social impact.

1.3 Research questions

In this study, multiple questions should be asked based on the scope of the study. The social side of the planetary boundaries are a little bit left out from the existing research and the approach of the scientific papers are economical or environmental. However, society and the value proposition – when it comes to business models – cannot be left out, because humans are part of the environment and the economy too. In conclusion, the study tries to analyse the impact of the value proposition design and explain why society is important in designing a business model.

This study tried to highlight the fact why sustainable development is important and how it can be connected to business models and why circular economy business models are important in the climate fight and building a responsible community and business community and how these

are connected to value. Rethinking business model and the possible ways of transforming a traditional business model to a circular one is an important topic now, because every stakeholder and every actor of the economy should participate of saving the ecosystem and our planet. The thesis tries to find an answer for the following questions.

- What is the role of local companies to develop sustainable solutions with the help of the SDGs and contribute to circular economy?
- How does value proposition design changes in the understandings of the circular economy?
- Why is it important to carry out changes in the value proposition design in circular economy business models?
- How can Norway Royal Salmon and Norwegian Fishfarming Technologies change their value proposition and work toward circular economy?

As it can be seen, the approach starts from the extended focus to a more focused one. To be able to understand the connection of these theories and issues one should consider many theories and understand the concepts. The outcome of the study is a framework based on different theories and on the case studies.

The two case companies are representing two different types of companies with traditional business models. These companies are on different stages of reaching the goals of sustainability and they are both part of the fish farming industry, but still they are different. One of them is focusing on salmon farming and one of them is focusing on building land based and accessible salmon farming solutions. Based on these two companies the study tries to have a deeper look in the salmon farming industry and the current situation of it.

1.4 Structure of the study – Research design

After the introduction, the study outlined the methods and the methodology followed by the theoretical framework with resources, context and concepts used and the most relevant literature. The theories are followed by the case study and the analysis. The results have been presented in Chapter 6, 7 and 8 (Fig. 2). The problems, the validity and reliability had been discussed in the discussion. At the end of the study, the conclusion summarizes the main findings.

1.5 Limitations

The concept of Circular Economy is a not newly developed concept that is not mapped out yet totally, but just as the concept of business models does not have a general definition of the term that can make the understandings of the thesis more difficult. There are many approaches, different understandings in know-hows.
The first limitations were the newly written and the yet-not-clarified terms in the concepts, but it has given the opportunity to come up with new and different perspectives on one term.
The second limitation was related to the literature, the literature is mainly about product design and producing material goods and not food or livestock. Because of this, the study’s biggest

question and limitation if the new value proposition design can be applied to primary industries or not and how the principles change in CE in non-manufacturing industries.
Another limitation is the period conducting the research, the exact topic has been decided in mid-February after a month-long preliminary research about circular economy that means that the time for conducting the research and evaluating the result took roughly four months. That can mean that the research could not go deep enough in many topics, but within the given time the research tried to gain and give an overview about the topic of circular economy, business models and value position with short lookouts on aquaculture, consumer behaviour, corporate social responsibility and systemic change.

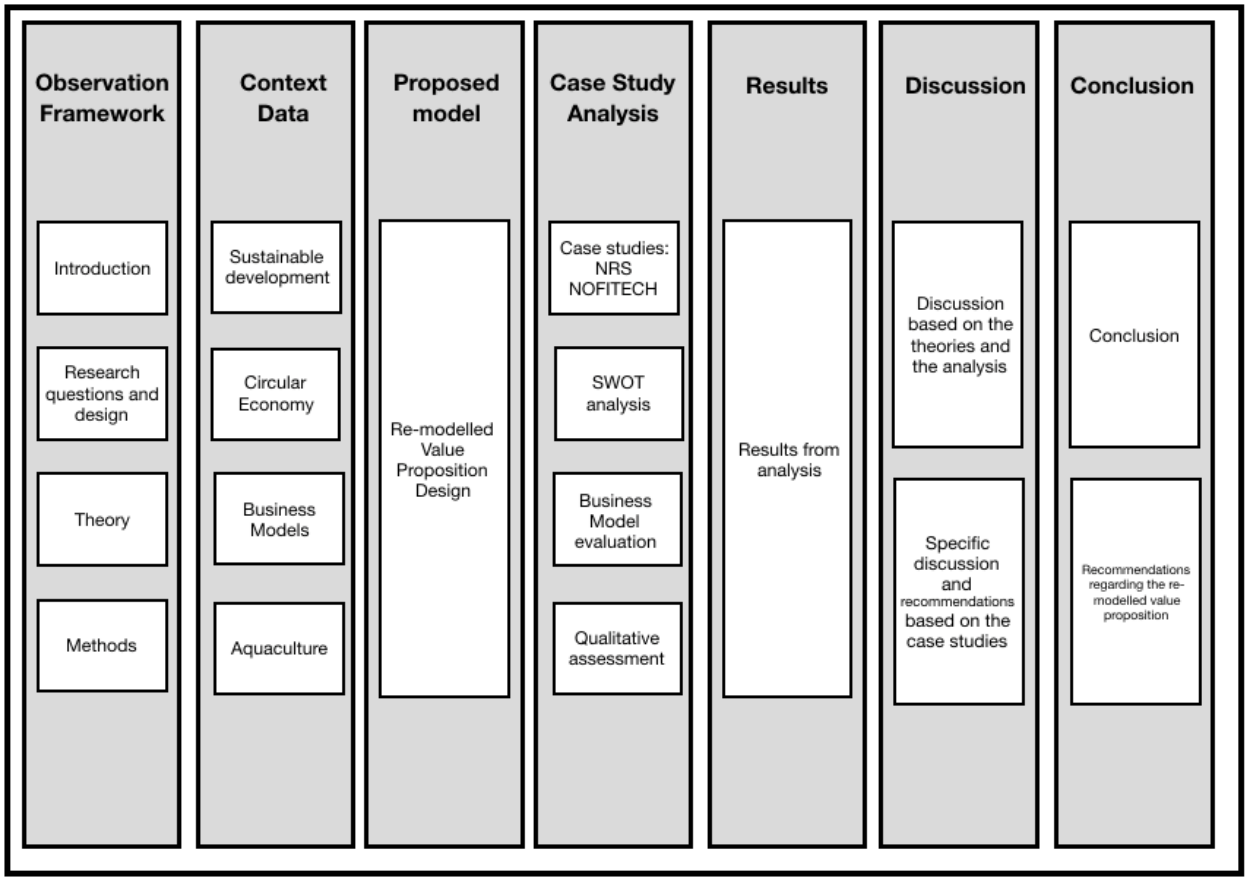


Figure 2.: The structure of the study

2 METHODS

In this study, the methods are following the example of the structure of the study (Fig. 2). It starts from the bigger scope to a more focused one while tries to map some related topics and fields to give a deeper understanding of connections in this field.
It tried to combine different types of methods to show that social science and business research are closely related to each other. The chapter summarizes and shortly introduces the methods used to build up this thesis with the strength and weaknesses and the ethical questions related to it.

2.1. Methods

The study follows qualitative research methods. It is based on five pillars, literature review, case study, SWOT analysis, business model mapping and qualitative assessment. With the help of these methods, the study should be valid and reliable (Chapter 7.3).
The data has been collected through literature review and meetings with the companies' representatives and using qualitative research. The collected data cannot be interpreted through quantitative research. Qualitative analysis risks the objectivity of the research, but it helps to recommend different ways of reaching the goals of the companies and apply the circular economy business models.

2.1.1 Literature review

According to Cooper (Cooper, 1998), the literature review is a measurement of different constructs and an interpretation of the meaning of the concepts, but validity depends on the quality of the review process. It is a measurement of the known and unknown in the research, it is not as clear as a quantitative research, in the literature review the data is measured and understood from a particular perspective and used for a specific purpose.
According to Dellinger (Dellinger, 2005), a single paper can have cumulative effects of the body literature. In the literature review of the study, the thesis tried to understand the concepts in an objective way and see how can they be translated or not on the level of study.

2.1.2 Case study

A case study is an intensive research about one particular factor or company analysed from a specific perspective. According to Flyvbjerg (Flyvbjerg, 2006) there are five types of misunderstandings when it comes to case studies.
One of them is about how theoretical knowledge is more valuable than practical. This study would like to show how theoretical knowledge and practical knowledge could be used together and how one cannot live without the other and how one case study can contribute to the bigger picture and why context oriented studies are important for the theoretical field. Case studies are not just for hypothesis building but for understanding the small-scale solutions and development too and they are not just for the researcher to prove his/her point but also for the research field to gain a new perspective on a specific topic and to develop additional thoughts and understanding for a general field.

In this study, the case study is going to be a helpful tool to illustrate local processes and solutions and how a small-scale solution (business model innovation) can contribute to a bigger (circular economy). However, it is only used to demonstrate the current state of the aquaculture.

2.1.3 SWOT analysis

According to Pickton and Wright (Pickton & Wright, 1998), SWOT analysis (strengths, weaknesses, opportunities, threats) should be used to categorize the environmental factors both internal and external ones. It should not be used as a separate tool; it should be used in a dynamic part of management and business development. The analysis allows focusing on key issues that affect businesses. Prioritization is a key issue in a SWOT analysis.
However, there are many limitations (Tab. 1) of the concepts. For example, it could be in the category of inadequate definition of factors and in the category of the lack of prioritization or over-subjectivity.

Inadequate definition of factors	Lack of prioritisation of factors	Over-subjectivity in the generation of factors: compiler bias
Factors which appear to fit into more than one box/ category	Factors which are given too much emphasis	Factors missed out: lack of comprehensiveness
Factors which appear to fit well into any box/category	Factors which are given too little emphasis	Serendipity in the generation of factors
Factors described broadly: lack of specificity	Factors which are given equal importance	Disagreement over factors and to which box/category they belong
Lack of information to specify factors accurately		Factors represent opinions not fact

Table 1.: Limitations in the use of SWOT analysis (Adapted from (Pickton & Wright, 1998))

SWOT factors require deep investigation in order to understand the nature of the business, but a well-made analysis can help to understand business more, just as the opportunities and the threats. An internal appraisal can analyse the organization based on the strengths and weaknesses while analysing the employees, the product, the innovative capability, the customer relationship, the facilities and the infrastructure, the efficiency, effectiveness and flexibility or size, location and accommodation. Organisational competencies could be customer engagement, invention, and discovery, making, and delivering. (Dyson, 2004)

The resource-based model (Fig. 3) focuses on the internal resources, capabilities and core competencies of the organisation and recommends possible strategies to assure competitiveness of an organisation and attractiveness of the sector.

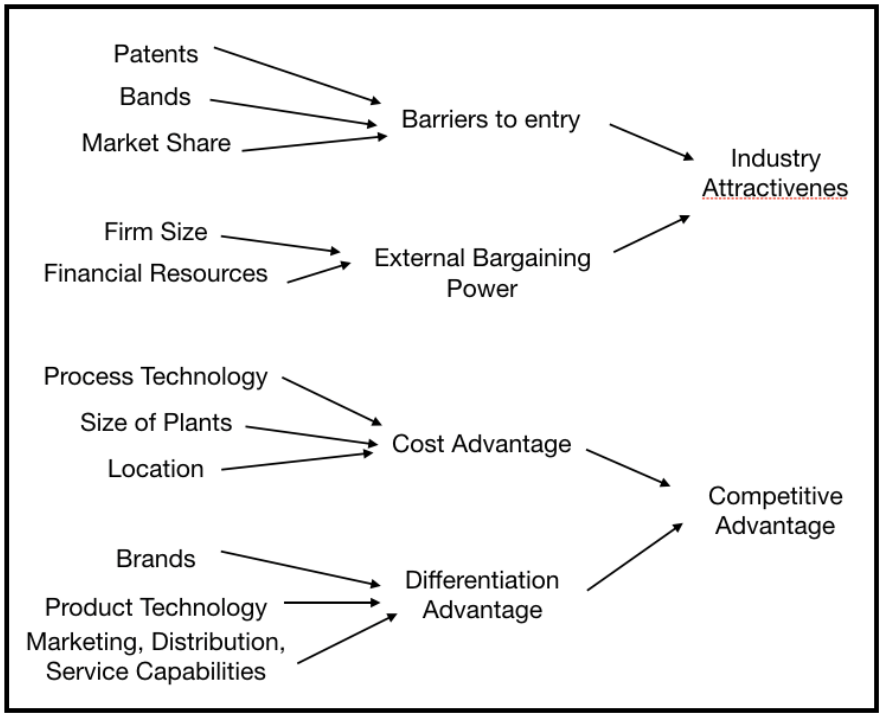


Figure 3.: Resource-based planning - (Adapted from (Dyson, 2004))

2.1.4 Business models and business model mapping

Whenever a business is established, it employs a business model that describes its value creation, proposition, and delivery and capture mechanisms. (Teece, 2010) According to Teece, the model is rather conceptual than financial and developing a model is insufficient to assure competitive advantage. It embodies and represents the organization and the financial architecture of a business. (Teece, 2010) The elements of a business model design are visualized in Fig.4. It shows how a business can turn their advantages into profit and how creating value can be turned into profit.

2.1.5 Qualitative assessment

Different organizations can be assessed with qualitative methods or quantitative methods. Usually they are described as exclusive methods, but in some cases mixed methods can be the most beneficial.

Qualitative data means the words and the sentences that are collected through interviews, focus groups, participant observation and related methods. (Yauch & Steudel, 2003) Based on collecting data and understanding in a partly subjective way to be able to apply to the researched topic. It emphasized a holistic study of the individual rather than the isolation and the precise measurement. Learning and developing, just as working in a group and highlighting differences

and different groups are the most important part of the qualitative method. (Goldman, 1990) The study used interviews, research-based analysis and previous knowledge and experience to carry out the thesis that are all part of the qualitative research method. The interviews had been conducted with the representatives of the companies.

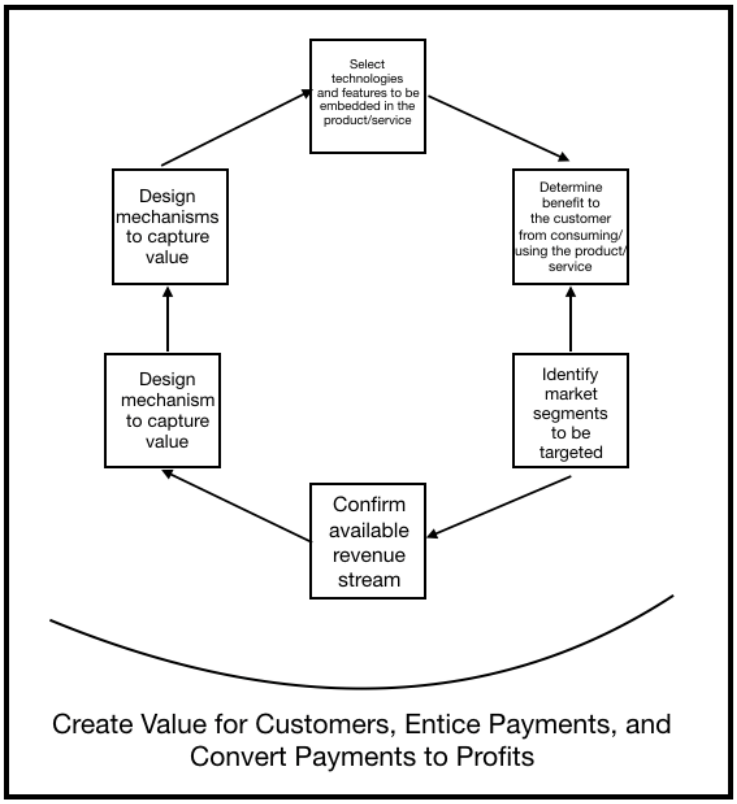


Figure 4.: Elements of a business model design (Adapted from (Teece, 2010))

During the interviews 12 question had been asked trying to understand the current value proposition map of the company and the plan of each company. The questions are based on Osterwalder et al. `s (2014):

1) What do they consider as pains and gains of their customers and how the company works on delivering value? How does the company react to problems?
2) What has bigger motivation when it comes to change - technology push or market pull?
3) How do they try to understand their customers?
4) How can they differentiate between high value and non- high value jobs?
5) Do they focus on the most important jobs, most extreme pains and most essential gains?
6) Do they focus on unsatisfied jobs, unresolved pains or unrealised gains?
7) Does it focus only a few pain relievers and gain creators, but does those extremely well?
8) Does it address functional, emotional and social jobs all together?
9) Does it align how customers measure success?
10) Do they focus on large number or customers or small amount who are willing to pay?
11) Does the company differentiate from competition in a meaningful way?
12) Does it outperform the competition substantially at least in one dimension? These questions tried to understand the companies' value proposition for customers and in the context of the

society.

2.1.6 Strengths and weaknesses of the study

The strengths of this study could be the weaknesses of it as well. With my background, I have a different approach than those students who studied industrial economics or business before writing their thesis. The social science background helped me to understand the social and environmental impacts of the question and not just focusing on the profit or the economical side of the study. In addition, the short period given for this thesis did not allow me to conduct deeper research than this, because of that there could be gaps and holes in the study, but I tried to outline a thesis that can show the connections between different segments of the Earth System.

Added value is essential to sustain a company these days, which means that making profit is not enough to survive and to have long-term plans.
The study tries to explore a currently new field with lack of related literature, but it tries to embed its research in the current paradigm and working in the framework of that.

2.1.7 Ethical questions

Before my research, filling out the NSD (Norsk Senter for Forskningsdata) scheme was a question for me to be able to carry out the research, but based on the questions of the scheme it was not necessary to fill it out. The age, name, nationality or ethnicity is not important in my case, during the interviews I talked to the representatives of the companies. However, these interviews should be seen as informal meetings where we shared our thoughts and knowledge with each other. The companies were treated in this research as partners instead of using them as a bad or good example to prove the point of the study.

3 THEORY

This part of the study tries to explain its theoretical background and the contextual framework to give explanation and context for the different theories and clarify what the study means under different concepts and terms. According to Zikmund, theories help to understand facts and situations with generalization. (Zikmund, 2000)
The following subchapters try to introduce the theoretical background related to the thesis. Through the different theories, such as globalization, climate change, sustainability leading to circular economy and business models, value proposition and systemic change and consumer behaviour, the chapter tries to build up the theoretical framework of the thesis.

3.1. Globalization

The concept of globalization is a part of our lives, it is mentioned everywhere and everyone has an idea what globalization means, but in most of the cases, people do not know what does it really mean or how globalization changed the way of what we think about different issues and how we react to different actions. To introduce the concept, I used one of my assignment papers from NTNU. (Urbán, 2017)

According to Anders Johnson (Johnson, 2008) globalization has three waves. In chronological order, the first wave was between 1860 and 1914, which was led by technological improvements in transportation technology and in an economical sense by the increased tariff barriers. The second wave began around 1944 and lasted until 1971 when tariff barriers and transportation costs increased. The last wave has begun in 1989 and according to him – the book was published in 2008 – we are still in the third wave with progress in transportation, in communication technology, increasing tariffs on products in high-income countries meanwhile with changing economic climate in developing countries.
However, one of the most important context for the waves, that we are in the Anthropocene, which means that we live in a human-led era where humans are responsible for the changes and the whole ecosystem has to face with the consequences of the actions of people, different organizations, companies, communities or governments.

However, globalization can be understood from a perspective of a geographical scale with the levels of global, national, local, and every day and body level. The concept of globalization can be understood in different ways on each level. The concept is based on a constant interaction between people, the international flow of money, ideas and culture.

The International Monetary Fund (IMF)(IMF, 2000) defined four basic aspects of globalization in their report in 2000. Trade and transactions, capital and investment movements, migration and movement of people and dissemination of knowledge. These four basic aspects show us through what channels globalization operates and how the different ideas spread.

Environmental challenges are affecting the concept of globalization, for example, air pollution does not stop at the border of a country and overfishing affect the whole eco-system not just the local wildlife where it is happening. Global warming is one of those challenges that has a

significant and visible impact overall the ecosystem. The current processes affect and affected by different organizations, economics, environment and socio-cultural resources as well.

There are some remote parts of the world that are not affected by globalization, but they influence our knowledge and our understanding of the concept through scientific researches. Yet, we have little knowledge of what they really seen of the world (e.g. drones, helicopters) because the researchers try not to get in touch with them.

To sum up, thanks to globalization everything is connected to everything and one influenced by another. People can meet each other on different platforms and have access to knowledge and to material goods, but this access depends on the country of origin, financial situation, social background, social status and gender. Globalization is not entirely equal or does not mean equality and that people from all around the world partake equally in the advantages of globalization, it is present in everyone's life so this a concept what cannot be come around.

3.1.1 Globalization and Circular Economy

Linear economy with the attitude of 'take-make-dispose' is not sustainable through using up all the natural resources and it influences the level of well-being of the global population, not just on the local population where different processes are happening or where the problems exactly appear.

Circular Economy has a big environmental impact with its proposed outcomes of saving the planet's resources and protecting the environment. Designing out the waste could help to slow down the global warming and polluting the nature. The concept of CE could be understood as a toolkit, it cannot be spread without globalization and without globalization, and the international problems cannot be recognized. To be more effective, the corporate and the governmental sector must work together to carry out circular solutions. However, CE does not mean one solution. These solutions should be localized and carried out locally, but different local solutions should be converged to each other and they should fit in a global framework in terms of the goals and the possible outcomes.

The concept of globalization is not decision-based; it is happening and cannot be influenced to stop it. However, the concept of CE and implementing of the concept is a decision what should be made by governments to pressure companies and it should be accepted by the society to implement its principles on a higher level of the decision-making processes. Different international organizations can push these decisions, but at the end, it depends on the local government. That is why, the concept and its connection to the local economy should be analysed by every local government to make the impact of it apparent for the society and develop solutions to make it easier to implement it.

3.1.2 Financial globalization

In his paper, Arndt (1999) wrote about the connection of globalization and economic development. The paper was written in 1999 and lot changed since then, but the principles of

the concept stayed the same. According to Arndt (1999) because of the technological innovation and declining trade, just as regulatory barriers the production of different components can easily happen in geographically distant areas. That gives an opportunity for international specialization and for increasing welfare. The gains of welfare comes from the fact that everyone can specialize in things what they are good at. (Arndt, 1999)

The argument of the flattening earth was analysed by McCann (2008) who said that the world is becoming more and more flat in the perspective of economic geography and spatial economics. He argues Friedman's view of the world which is becoming more flat, according to McCann, Friedman's notion implies that greater similarity and homogeneity can be observed between different parts of the world and between different people. (McCann, 2008)

Changes in relationships between individuals and between collective actions regarding social, political and environmental issues can be caused by the development of information technologies. These changes influence the attitude of a customer and the attitude of an organization. According to Kose et al. (2009), the urge for financial globalization was growing since the mid 1980-s, because emerging market countries were compared to advanced economies and measured by their standards, but they were not really a part of the global market. The factors driving financial globalization can be broken down to 'pull' and 'push' factors which are influenced by and related to different policies and developments in low-income countries and to changes in global financial markets. (Kose, Prasad, Rogoff, & Wei, 2009)

3.2 Climate change

Climate change is one of the most urging issues. According to Figueres, technology is developed enough to make the 2015 Paris Climate Agreement possible and fossil free economy is already showing that it is profitable. (Figueres et al., 2017) The year 2020 is highly important when it comes to climate, because timing is everything in the case of sustainability and climate change. The use of renewable energy resources is constantly growing, but there is still strong headwind against the use of renewable resources that can slow down the process of becoming sustainable and circular.

Figueres (2017) established six milestones in six sectors to reach the goals until 2020. Renewable energy resources should make up the 30% of the world's electricity supply by 2020. Cities and states should fully decarbonize buildings and infrastructures by 2050. Electric vehicles should make up 15% of the global sales of new cars. In land use, there should be a shift towards reforestation and afforestation efforts. Heavy industry should cut the emissions and publish plans for increasing efficiency. The financial sector should mobilize 1 trillion dollars per year for climate action and most should come from the private sector. More green bonds should be established which should create an annual market which processes more than 10 times the 81 billion dollars. To reach these goals, science and scientific researches should be used to reach these targets, the already existing solutions should be up scaled and encouraging optimism is crucial because without that no one will work towards these targets. (Figueres et al., 2017)

These targets and goals are important to develop a safe operating space for the humanity. To understand what a safe operating space is; Rockström (2009) introduced the planetary boundaries (PB). The PB are values for control variables that shows if the thresholds have been crossed or not. If they are crossed, the process cannot be reversed anymore and it damages the Earth System for good. (Rockström et al., 2009)

One of the boundaries is climate change. The global mean temperature should be no more than 2 degrees above the pre-industrial level. Climate change has two parameters, one is the atmospheric concentration of carbon dioxide and the other one is radiative forcing. Rockström et al. (2009) proposes that the atmospheric concentration of CO_2 should not exceed 350 ppm (parts per million) by volume and the radiative forcing should not exceed 1 watt per square metre above pre-industrial level. Transgressing these boundaries should risk an irreversible change. According to them, the current climate models do not include the long-term reinforcing feedback processes that could further warm the climate. (Rockström et al., 2009) The stability of the large polar sheets should be taken into consideration as well and the possible end of the Holocene as well.
The delicate balance should be conserved, because if one boundary is crossed then the others are in higher risk as well. This is a science-based analysis of the risk how human behaviour is going to destabilize the Earth System. (Steffen et al., 2015) Facing with these problem on a planetary level means that the magnitude of is different, so stopping it or slowing it down takes more effort as well. According to Steffen et al. (2015) genetic diversity is important and the biosphere too. They look at PB as an additional framework that should be implemented within the Sustainable Development Goals targets to have thriving societies around the world.

3.2.1 Climate change and economy

Based on Deke et al.'s paper (Deke, Hooss, Kasten, Klepper, & Springer, 2001) to be able to translate the changes in climate parameters (temperature, sea-level rise etc.) needs a more complexed model to explain the impact on the economic activity and on the economic welfare. There are many conceptual problems of measuring the impact of the climate change on the economy. The damages should be measured with the help of existing price system, but these systems change with time because of inflation or deflation. Many damaged non-market goods for example, landscapes or human life or weather change cannot be measured in money, just as human reactions that are hard to measure too.

3.2.2 Climate change and Circular Economy

When is it comes to climate change, dealing with risk and uncertainty involves normative judgments and steps towards solutions. (Rockström et al., 2009) CE can give a framework for this. It can be the solution of many waste-related environmental problems. Preston (2012) writes about global redesign and how CE can transform the role of the resources in the economy, so the waste from factories could become a valuable input to another process. (Preston, 2012) For example, Life Cycle Assessment (LCA) is important in the literature, typically under the umbrella terms of eco-design, design for environment and sustainable design. Most of the methods are related to designing products for multiple lifecycles and existing tools and methods

are able to support this change and foster sustainable product lifecycles. (De los Rios & Charnley, 2017)
Different approaches and related strategies has been showed in Table 2 and different focuses and the related strategies. From the figure is can be seen that sustainable design and circular economy have different approaches and focus, which means that the methods and the strategy will be different too.

It can be seen how the focus and different strategies shift with different approaches. Circular Economy is mostly present in the design for life cycle, just as it was mentioned above. Longer lifecycles and multiple lifecycles or cradle-to-cradle mean design for reliability, for maintenance, for reuse and for material recovery. The methods to carry out these strategies map and meet the principles of CE, with designing for repair and refurbishment, for upgrading, for remanufacturing, for recycling and for cascaded use.

APPROACH	FOCUS	STRATEGY	DFX/METHODS
WHOLE SYSTEMS DESIGN	SUSTAINABLE SYSTEMS	Radical innovation for sustainability	
		Reduced environmental backpacks	
DESIGN FOR ENVIRONMENT (PREVENTIVE)			Design for Supply Chain
	ENERGY CONSERVATION		Design for Manufacturing and Assembly
		Clean energy consumption	Biomimicry
	MATERIAL CONSERVATION	Material selection for sustainability	
DESIGN FOR LIFE CYCLE	DESIGN FOR EXTENDED LIFE (LONGER LIFECYCLES)	Design for Reliability	Design for Quality
		Design for Maintenance	Design for Repair/ Refurbishment
		Design for Reuse	
			Design for Upgrading
	DESIGN FOR END-OF-LIFE (MULTIPLE LIFECYCLES/ CRADLE TO CRADLE)	Design for material recovery	Design for Recycling
			Design for Cascaded Use

Table 2.: Taxonomy of design approaches for sustainable industry - (Adapted from (De los Rios & Charnley, 2017))

3.3 Sustainability and sustainable development

The requirements of sustainable development can be characterized by these three aspirations: economic growth based on social justness and the sustainable use of natural resources according to Seiffert and Loch (2005). The interrelation between these has to occur in a balanced way. (Seiffert & Loch, 2005) It is important to mention that the fulfilment of the three types of aspirations tend to conflict each other on the short run, that is why, according to Seiffert et al

(2005) the solution lies on the intermediate point, when none of them is taken individually and they can reach their optimum level.

The issue of sustainability came with the growing resource demand and the risk to supply. The population is growing and the GDP is increasing, but the planet is running out of resource supply for example minerals, water and energy while the emission is increasing. (Andrews, 2015) Despite the innovations and the technological, medical and other advances, Linear Economy is not sustainable and there is need for an alternative model.

Many of the manufacturing industry are still following the take-make-dispose triangle due to the speed at which the planet's resources have been exploited. Circular economy could be one of the pathways to product sustainability. It can refer back to the criteria of sustainability design and tools, regardless the corporate sustainability strategies. (De los Rios & Charnley, 2017)
The capabilities what have been found by De los Rios et al (2017) to be the key learning goals in the terms of design and design skills had been listed in Table 3. The designer should understand the different parts of supply chain (logistics, distribution), the process of value proposition and delivery (service experience, user expectations and use), the production of a particular good (engineering, possible failures, maintenance, aesthetic, particular good, how to handle limited supplied components). These have been visualized in Table 3 in the understating of capabilities to leverage product design, how skills can work toward circular economy.

3.3.1 Sustainable Development Goals

When it comes to circular economy, Sustainable Development Goals and the understanding of them is necessary. Aquaculture and sustainable food production is present in the Sustainable Development Goals as well. The study tries can focus on many SDGs, such as Goal 2: Zero Hunger, Goal 3: Good Health and Well-Being, Goal 6: Clean water and sanitation, Goal 8: Decent Work and Economic Growth, Goal 9: Industry, Innovation and Infrastructure, Goal 11: Sustainable Cities and Communities, Goal 12: Responsible Production and Consumption, Goal 13: Climate Action, Goal 14: Life Below Water.

However, the study's goal is to develop a value proposition framework for aquaculture, so the SDGs that can be connected to this in the most direct way are Goal 2, Goal 8, Goal 9, Goal 12 and Goal 14.

Goal 2 – Zero Hunger. The main target of this goal is having less food waste and developing a balanced diet for everyone. People should change how they look at food and consume food. Not just agriculture and forestry should change how they act and grow food, but fisheries should too. With the current way of exploiting the seas and oceans, there will not be any food left in the oceans. The reason of that is the unsustainable fishing. Fishing without thinking about the fact that amount of seafood cannot be sold and it goes to waste. If human action is not enough to degrade the ecosystem, climate change has a big effect on the changing ecosystem too. Animals can adapt to the changes until a point and through decades, but more and more invasive species are expanding throughout the ecosystem that can cause of the extinction of many other species.

Aquaculture and fish farming can be a solution for feeding humans, but in a sustainable and environmentally friendly way that is not harming the ecosystem.
To sum up, extreme hunger and malnutrition is a barrier to sustainable development. It means less productive individuals who are more exposed to diseases.

Goal 8 – Decent work and economic growth. Sustainable economies require the societal conditions, for example healthy and equal societies. Having a job is not enough to escape poverty; social and economic policies are needed too, which are targeting the eradication of poverty. Sustainable economies have the conditions that allow people to have quality jobs that stimulate the economy, but not harming the environment and every citizen has equal right and equal opportunity to get a job. Women should earn the same amount of money for the same job as men do, the global gender pay gap should diminish. The opportunity to participate in the life of a community should have equal access too, for example, women are still responsible for unpaid care and domestic work what retains them for participating. If more people is productive in one society, then it contributes to fight the poverty on a global level, and it can fight for peace too. Employment helps integration, prospects for personal development.
In the case of the study, both companies are trying to become part of the local community through offering jobs and they both located in the North. However, in the case if they expand, both of the companies have the responsibility to offer equal opportunities and they are responsible every stakeholder on their supply chain because it influences their reputation.

Goal 9 – Industry, Innovation and Infrastructure. This goal can set the framework for circular economy and repurposing old material. Investments and innovations have key roles in sustainable development and in the same time, these actions are empowering communities, which leads back to Goal 8, with peaceful societies and equal opportunities for everyone in the community. Technological progress has a key role in achieving environmental objectives. It can lead to the development of many aspects of the communities' daily life.
Developed countries have the potential for industrialization in food and beverages with prospects for sustained employment generation and higher productivity.

Goal 12 – Responsible Consumption and Production. This goal is promoting resource efficiency, sustainable infrastructure and providing access to basic services, such as green and decent jobs and better quality of life. The implementation of the goal and achieving its targets helps to achieve an overall development plan, reduce future environmental and social costs, strengthen economic competitiveness and reduce poverty. It can give a great starting point for CEBMs with promoting the 'doing more with less' attitude. It shifts the focus to the stakeholder all over the supply chain, including consumers and engaging them in sustainable public procurement.
Humanity must maintain the 0.5 cent of water for all man and secure access to freshwater to everyone. Households should be more conscious about their dietary choices and habits, because this affects the food-related energy consumption and waste generation.

CAPABILITIES TO LEVERAGE PRODUCT DESIGN	SHARING PLATFORMS	PRODUCTS AS SERVICES	PRODUCT LIFE EXTENSION (CONSUMABLES)	PRODUCT LIFE EXTENSION (HIGH-END)	PRODUCT LIFE EXTENSION (REFURBISH AND UPGRADE)	PRODUCTS AS SERVICES (REMANUFACTURE)	MATERIAL RECOVERY	CIRCULAR SUPPLIES
Understand logistics and distribution processes			X				X	X
Understand the service experience and how to design services	X	X	X					
Understand user expectations and perception of value	X	X	X	X		X	X	X
Understand factors of the use experience	X	X	X	X				
Understand product wear by use	X	X	X	X	X	X		X
Assess material physical and chemical properties				X				X
Understand engineering functions of the product	X				X	X		
Understand failure mode and maintenance procedures	X				X	X		
Understand processes for reverse and re-manufacturing		X		X	X	X	X	
Solve aesthetic and structural problems with limited supplied components					X	X		

Table 3.: Design skills necessary to create products for closed loops - (Adapted from (De los Rios & Charnley, 2017))

Goal 14 – Life Below Water. The world's oceans drive global systems, such as temperature, currents, oxygen, life, that make the Earth habitable. Oceans and seas are vital for humans and animals, not just because of their environmental effects, but because they have been the main platforms for trades and transportation.
Careful management of water is a key to sustainable future. It represents 99% of the living space by volume. Over billions of people depend on marine and coastal biodiversity for their livelihoods. It has a big role to absorb carbon dioxide and buffer the impact of global warming. Due to the pollution, the marine ecosystem is changing rapidly. Overfishing and polluting the biodiversity of the ocean have key roles in the collapse of the marine ecosystem.

3.3.2 Sustainability in Aquaculture

Aquaculture contributes to the local and global food supplies, while it improves food security, generates household income and contributes to the national and the global gross domestic product, creates direct and indirect in many regions and contributes to the international and the national trade. It generates two types of services. Provisioning services, sociocultural and regulating services. (FAO et al., 2016)
Provisioning services mean that aquaculture generates employment, livelihood opportunities, income, GDP, export revenue, food supply, poverty alleviation and increases efficiency and productivity in farms. It is present both at the individual and household level and at the aggregate level, such as community, national and global level. (FAO et al., 2016)
Sociocultural services mean that small-scale aquaculture products shoe prestige and status and strengthen social bonds through gifting and ritual services. Besides it contributes to women's empowerment and in some, low-income countries women dominate jobs at certain parts of the value chain. (FAO et al., 2016)
Regulating services are connected to provide waste assimilation and environmental cleaning, waste storage and drought release. Nutrient recycling and integrated pest management can be viewed as part of these services. (FAO et al., 2016)

European Aquaculture Technology and Innovation Platform released a review of the current state of the European aquaculture.

There are more than 40 different species raised in European aquaculture, what means around 3 million tons of fish and molluscs from that 1.3 million tons located in the European Union. The industry secures around 200000 jobs. It uses 3.2 million tons of formulated feeds; there is an increasing research on the field. There are strong but sometimes restrictive legislation and it is difficult to license and access to space. (EATIP, 2017)

EATiP's vision (2017) was developed in eight thematic areas, such as product quality., consumer safety and health, technology and systems, managing the biological life cycle, sustainable feed production, integration with the environment, knowledge management, aquatic thematic areas can be based on SDG's, but at least connected to them. The European Aquaculture should provide safe food of the highest quality and nutritional value, across a wide range of products adapted to consumer preferences and lifestyles. It plans to adapt the cultivation of macro- and microalgae and offer new opportunities in Europe. According to them,

there are four main challenges for the sector: competition in the marketplace, access to and competition for space, improving resource use, governance of the sector.

The organization's plan is to make the European aquaculture sustainable and globally competitive, its three core priorities are establishing a stronger relationship between the aquaculture and the consumer, assure a sustainable aquaculture sector and consolidate the role and importance of aquaculture in society. The report highlights the importance of research multiple time and the capacity progress within the aquaculture value chain. There are risks what have been identified as a threat for these scenarios. The strategic risks and hazard risks. Strategic risk could be competition circumstance, European and national policies, public perception and consumer concerns, financial and economic risks, sectoral competence skills, knowledge management, lack of funding or the research required to implement the Strategic Research and Innovation Agenda (SRIA) and associated action plans. Hazard risk can be the effects of climate change, disease and infections, food safety and public health.

According to their survey what has been requested to prioritize the problems. The most important areas are product quality, consumer safety and health; aquatic animal health and welfare; sustainable feed production and integration with the environment.
Product quality and safety was about identifying and closing harmful gaps in consumers' perception about aquaculture products and the current scientific knowledge, just as identifying, managing and eliminating existing and potential physical, chemical and biological hazards and emerging risks; defining and standardise quality parameters of aquaculture products and exploring the differences in terms of health benefit between species and production methods including feed composition.

In the case of technology and systems, higher prioritisation was given to integrate technology management and biology to improve welfare and prevent disease outbreaks, reduce the incidence of diseases by developing technology and systems and developing technologies for improved quality of seed for all present and future production systems.
Managing the biological lifecycle should be more equally funded. Selective breeding is important because of different factors (feed, disease resistance, feed efficiency, flesh quality, nutritional profile and human health factors). The role of improving animal performance is significant on all stages of the growth or developing efficient tools or adapt existing tools from other sectors and to achieve this identifying and quantifying genetic correlations between productive and disease resistance and welfare straits what will enforce synergies between traits and avoid unwanted effects of selective breeding.

Sustainable feed production is a long-standing issue. Knowledge and nutritional requirements should be improved. Providing a sufficient characterization of nutritional value of alternative raw materials, considering sustainability is crucial in the process.

Harmonising the environmental regulations and legislations and implementing common regulations among European countries, just as establishing integrated management tools for waste emission considering assimilation capabilities and improving feeding technology and

feeding management and feed composition to minimise biogenic emission from aquaculture. Managing and transferring knowledge including the dedicated transfer to identified users and translation of research results for stakeholder uptake to be able to do that, effective links between industry and research communities should be created.

Management-wise reduced time from application to get the operating licence would be helpful for the industry, just as identifying incentives to promote investments in aquaculture and ensure longevity of sustainable production.

None of these matters without healthy fish, which means that new vaccines and improvement of existing vaccines and diagnostic tests should be developed, just as minimising the treatment and improve understandings on the field of host-pathogen interactions and of transmission mechanisms of pathogens at all levels from farm, through country, to Europe wide.

The conclusions of the survey was that higher accent on operating technologies, better control within hatchery controls, more nutritious feed, aquatic animal health as top priority. (EATIP, 2017)

3.2.1.1 Coldwater Marine

By 2030, the production should grow by 4% per year and salmon will remain the main species, but other will increase such as employee productivity should increase by 50%. There will be a trend towards multifunctional farms and higher levels of offshore aquaculture. The action plan contains steps towards the development and use of more plant materials for feed, better communication and promotion, solution against escapees and identify limitations for open sea on growing.

3.2.1.2 Freshwater

The freshwater production growth should reach 1.5% per year and trout and carp would remain the core products, but the industry should go through some diversification and establish new activities.
Diversification and integration should be encouraged, such as increasing competitiveness and maintaining high quality products and promoting innovation. The responses to predators and market understanding should be improved. Environmental services should be defined and local economies should be the centre of the focus. When it comes to freshwater industry establishing a genetic bank of native populations is an important step as well.

3.4 Corporate Sustainability Strategies

Baumgartner and Ebner (2010) introduced systemic change through the implementation of corporate sustainability and the factors what can affect this implementation (Fig. 5). There are different types of corporate sustainability strategies, there are introverted, extroverted

(conventional and transformative), conservative (focusing in efficiency) and visionary (holistic) strategies.

The economic dimension is often discussed as the generic dimension of corporate sustainability; it embraces general aspects of an organization to be able to stay on the market. A business should obtain economic success to continue its work; these aspects could be innovation and technology, collaboration, knowledge management, processes, purchase and sustainability reporting. (Baumgartner & Ebner, 2010)
The ecological aspects of the corporate sustainability are the resource use including recycling, emissions into the air, into the water, into the ground, waste and hazardous waste production, impact on the biodiversity and environmental issues related to the product.
The social dimension could be internal and external. The internal are the corporate governance, the motivation and incentives, health and safety of the employees and the human capital development. The external aspects are the ethical behaviour and human rights, no controversial activities, no corruption and cartel and corporate citizenship. (Baumgartner & Ebner, 2010)

According to Porter (Porter, 1997) there are two generic competitive strategies for a company to be successful. It can deliver unique products and services or it can deliver the (not unique) products and services on the lowest price. Porter's strategies are about profit, but profit is not enough anymore to be successful on the market, a business has to offer something else as well. Two criteria should be used to map and monitor the relation between sustainability and competitive strategies: the costs caused by sustainability and the receiver of the benefits due to the CSR. It can lead to decreased, increased or constant costs. (Baumgartner & Ebner, 2010) The beneficiaries can be the society or the customer or both. The relation between competitive strategies and corporate sustainability can exist on four levels: force, where sustainability strategy support and it is essential for the competitive strategy, pressure means that sustainability strategy is helpful for the competitive strategy, option is about that the sustainability strategy is one possibility for the company and forbidden indicates that there are conflicting goals between sustainability and competitive strategy based on Baumgartner and Ebner (2010).

System thinking is crucial to make a company more sustainable and avoid greenwashing. In order to do that environmental management has an important role in formal and in informal, public and private way to develop and implement cost effective priority actions (Seiffert & Loch, 2005). The real risk for the future lies in there, if the systemic character of the environment and enterprises and the economy is going to be ignored and the solutions developed without the understanding of the system. It is becoming more and more important to control demographic density and foster a more balanced distribution of income, because they all influence the ecosystem. The transition to sustainable development will ensure the quality of life and the survival of the earth, because human irresponsible behaviour is clearly seen on a global level for quite a while. (Seiffert & Loch, 2005)
Systemic approach can be the solution and the strategy of natural systems in a fabricated system, because there will be an internal guide to viable agricultural and industrial process and an internal guide to develop more efficient environmental policies.

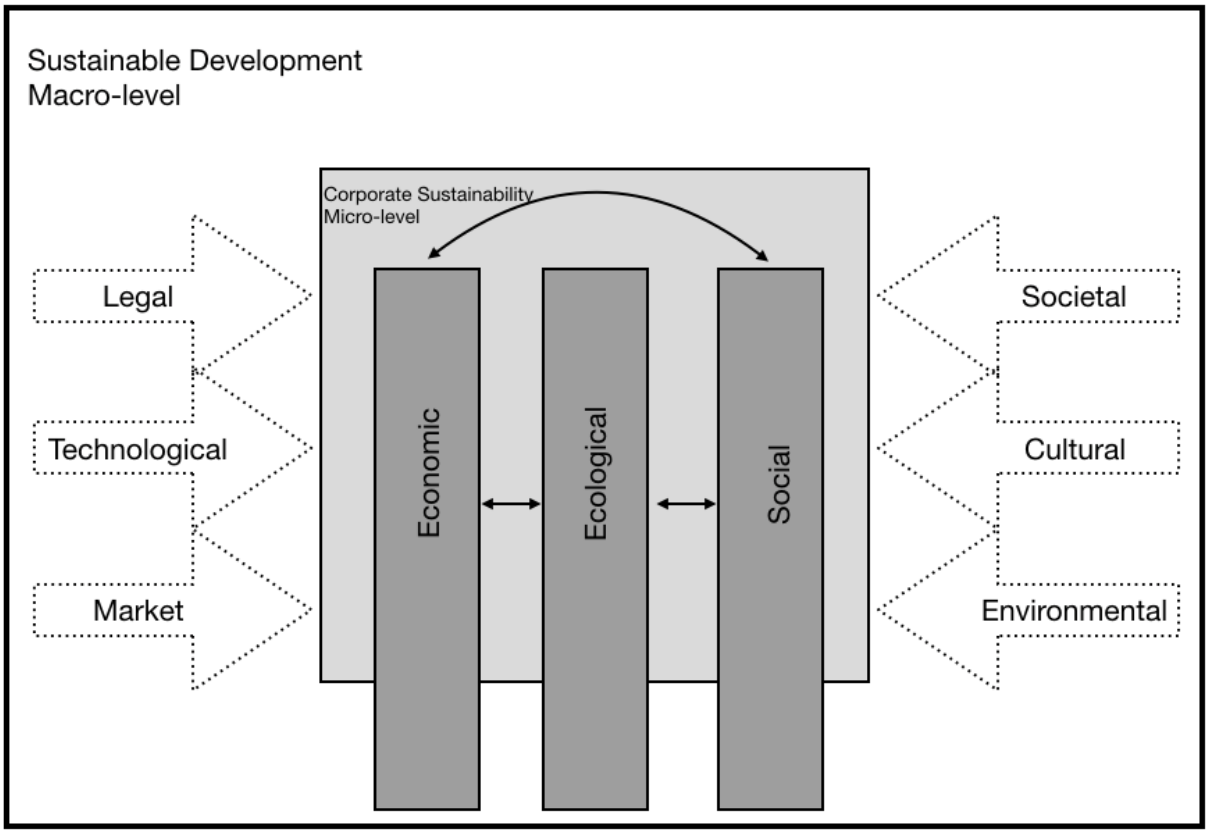


Figure 5.: Corporate sustainability and its interdependences (based on the work of Ebner and Baumgartner (2006)) – (Adapted from (Baumgartner & Ebner, 2010))

	Actor bonds	Resource ties	Activity links
Interaction elements: Technical exchange	Know how to work together in relation to a specific resource or activity.	Minor changes in facilities and business units concerning specific resource. Often one-sided.	Minor changes in related activities, often one-sided.
Limited CS	The firm-stakeholder relationship is based on short-term needs, and flexibility is maintained. Third-party organizations can be relevant in the adaptation processes, but only indirectly.		
Interaction elements: Cooperation	Know how to adapt to each other in relation to different types of resources and activities.	Mutual changes in several types of resources.	Mutual changes in joint and related activities.
Potential CS	The firm-stakeholder relationship goes beyond short-term need of individual actors. Both parties make clear commitment to contribute towards mutual and long-term objectives. Third-party organisations can be relevant in the adaptation processes, but only indirectly.		
Interaction elements: Networking	Know how to systematically relate to several parties in co-managing resources and activities.	Mutual changes in relation to several parties in several types of resources.	Mutual changes in relation to several parties in joint and related activities.
Substantial CS	Third-parties are an integrated part of the firm-stakeholder relationhship and decision-making processes are based on contributions from coalitions of actors. Employees from more than two organisations work together in cross-functional groups.		

Table 4.: A typology framework for interactive CS - (Adapted from (Vildåsen & Havenvid, 2018))

Vildåsen and Havenvid (2017) have developed a framework for interactive corporate sustainability. It can mean technical exchange, cooperation and networking dependent the firm's approach. Table 4 defines three types of CS, that means it can develop from a "lower" category to a "higher". Limited CS where the firm acknowledges one specific stakeholder and the organization interact related to a specific resource or activity. Potential CS is established between a firm and a specific stakeholder. Substantial CS reflects a situation where decision-making processes are based on coalitions, where actors are representing different perspectives.

Corporate Social Responsibility has a significant role in creating value in a meaningful way. If a business is socially responsible, it is easier for them to develop a value proposition design that reacts to the needs of the local or the global community.

3.5 Circular Economy

Industrial ecology (IE) provides the foundations for the idea of the circular economy. (Lüdeke-Freund et al., 2019) CE principles can be understood as guidelines to redesign the economy, which requires changes on every level. It requires changes on the macro-level (cities, provinces, regions and nations), on the meso-level (networks, eco-industrial parks) and on a micro-level (individual companies, consumers).

Based on Geissdorfer (2017) circular economy can be defined as a regenerative system in which resource input, waste, emission and energy leakage are minimised by slowing down, narrowing and closing material and energy loops. These changes and goals can be achieved through life-cycle design, maintenance, and repair, reuse, remanufacturing, refurbishing and recycling. (Geissdoerfer, Savaget, Bocken, & Hultink, 2016)

Circular economy is not a new concept; several authors already recognized in the sixties the negative impacts of global industrialization. Kenneth Boulding in his essay called 'The Economics of the Coming Spaceship Earth' (1966) argued for a future economy in which humans think about Earth as a closed spaceship and using the planet's resources based on that. (Kraaijenhagen, Van Oppen, & Bocken, 2016) The attention to finite resources and growing population has been brought more than four decades ago by the Club of Rome and Barry Commoner introduced the four laws of ecology based on Kenneth Boulding's work:

"1) Everything is connected to everything else. There is one ecosphere for all living organisms and what affects one, affects all.

2) Everything must go somewhere. There is no waste in nature and there is no away to which things van be thrown.

3) Nature knows best. Humankind has fashioned technology to improve upon nature, but such change in a natural system is likely to be detrimental to that system.

4) There is no such thing as a free lunch. Exploitation of nature will inevitably involve the conversion of resources from useful to useless forms." (Kraaijenhagen et al., 2016)

The laws of ecology represent the core of CE and how everything stays in the resource loops regardless its new form.
CE is a market-driven solution to reduce and redefine waste and balance the use of finite resources. The resource loop should be closed so finite resources would be captured and reused. It replaces the linear end-of-life concept with a shift towards restoration, elimination of chemicals and waste through the whole process and careful design of materials, products and business models and systems. Slowing resource loops and slowing consumption are important goals of CE such as redefining the value of the waste. Waste is traditionally seen as a low-value product in western economies, recycling, upcycling and understanding the value of the waste and create something else from is one of the basis of CE.
The definition of CE from Kraaijenhagen et al's (2016) means that in CE different stakeholders collaborate to maximise the value of their products and materials while they minimise the exploitation of natural resources and create positive societal and environmental impact.
The corporate sustainability agenda developed so much that the step towards circularity would be logical. On a global level, CE would help to industrialize in low-income countries, increase wellbeing, and reduce vulnerability to resource price shocks in developed countries. CE is about remodelling industrial systems and recognizing efficiency of resources cycling. (Preston, 2012)

According to Andrews (2015), CE by eliminating the initial life cycle stages reduces the quantity of spoil. (Andrews, 2015) In CE, resource loops should be closed and newly made products would be made from plant based or biodegradable materials that means that a deep change is needed in the economy. Despite the growing interest in sustainable solutions, the awareness of the concept is low; developing the concept's groundwork could help deeper understanding, encourage cooperation and avoid confusion. (Preston, 2012) CE offers a new form of value creation, the innovation of key areas opened new opportunities for new solutions, additional to that more, and more governments are interested in the topic. Preston (2012) outlined three components that can shape the progress towards CE such as redesigning the industrial systems, the principle of 'cradle to cradle' and how changing consumer behaviour could help determine the future of the resources. Redesigning industrial system does not happen overnight. To be able to reach higher level of goals the deployment of efficient technology needs to be complemented by systemic changes. (Preston, 2012)

Cradle-to-cradle production is about turning the traditional linear industrial economic model to a sustainable system that can be to create goods and services that generate ecological, social and economic value. Not only products what make money, but products that avoid harming the environment and the society and have positive impact on both. If the change in product design and business models is a big step for any company and if it is successful, it can be widely adopted by other companies. These transformations require system changes that go beyond the individual firm, but they are embedded in networks, partnerships. Collaboration has an important role to develop systemic changes, because acts and movements should be synchronized and for that, knowledge and skills should be brought together.

The change in the consumption patterns have a big role to shift from 'business as usual'. The key-issue is resource efficient changes that can be achieved by sharing and recycling the

products, used by the consumers. Collaborative consumption and sharing economy is challenging the traditional types of ownership with the aftereffects of lower prices and costs for the customers and for the businesses. (Preston, 2012) Those companies that engage in these changes could be a closer relationship with their customers. However, despite the different efforts, conventional ownership is still more important for consumers than being environmentally friendly and getting goods for lower price. (Preston, 2012)

Measuring the progress at the national level, the poor availability, quality and consistency of the data remain significant obstacles. However, at a global level, thanks to the enhanced information technology and the ability to track both resource and value flows enables companies to identify wasteful processes along the supply chain and develop new approaches. There are already visible steps made by governments where is it needed, the knowledge for CE already exists, now it should be implemented. International cooperation has an important role on the CE because trade in waste and using resources may involve multiple countries.

According to Preston et al. (Preston, 2012) there are many barriers when it comes to implementation, for example lock-in to resource intensive infrastructure and development models, political obstacles to putting an appropriate price on resource use, high up-front costs, complex international supply chains, lack of consumer enthusiasm, challenges for company-to-company cooperation, the innovation challenge. In their article, they recommend some practical steps towards the implementation of a circular economy. For example, best practice and knowledge sharing could be a useful tool for the implementation of CE in a wider context, but this requires analysis of the economic impact of CE practice and business models at product and firm level. Developing smart regulations and tools for consumers should role to set to rules by the government for the private sector, such as support for innovation, setting the conditions for investment and encouraging business-to-business and business-to-university linkages. Standardization (e.g. labelling system) can help accelerate innovation by removing bottlenecks and encouraging economies of scale. The next generation's ideas are just as important as raising public awareness or setting credible benchmarks and support developing countries.

CE requires transformation from every actor on the supply chain. Different kinds of product cycles take place within the CE, some of the loops involve companies maintaining economic value as long as it is possible, and some involve adoption of resources that can be introduced to the nature again. (De los Rios & Charnley, 2017)

Important to recognize the two broad and complementary policymaking strategies that can accelerate the circular economy. One of them is fixing the market and regulatory failures, the other one is stimulating the market activity with different actions, for example with setting the targets, changing the public procurement policy or creating collaboration platforms. (Lewandowski, 2016)

Circular economy is restorative by design; it offers an alternative on a global and on an organisational scale. CE requires companies to rethink and in some cases rearrange their supply

chain and their business models, CEBMs (Circular Economy Business Models) can be an answer to that. (Lüdeke-Freund et al., 2019)

3.5.1 Connection between sustainability and Circular Economy

There are similarities between sustainability and circular economy according to Geissdoerfer et al. (Geissdoerfer et al., 2016) In their study – The Circular Economy – The new sustainability paradigm? – they listed twelve (12) similarities.
These are: intra and intergenerational commitments, more agency for the multiple and coexisting pathways of development, global models, integrating non-economic aspects into development, systems change/design and innovation at the core, multi-/interdisciplinary research field, potential cos, risk, diversification, value co-creation opportunities, cooperation of different stakeholders necessary, regulation and incentives as core implementation tools, central role of private business, due to resources and capabilities, business model innovation as a key industry transformation and technological solutions are important but often pose implementation problems. In the study, the authors highlighted the differences between the two concepts (Tab. 5).

Both concepts employ a multi-disciplinary approach including a non-economic aspect that leads to that assumption that system design and innovation are the main drivers. The concepts describe the importance of diversification and the opportunities for value creation. Additional to that, they rely on incentive structures. Important to mention, when it comes to differences that the goals of the concepts are different. It seems like the CE is only aiming to close or slow down the loops and eliminating all resource inputs and waste emission leakages of the system. The goals of sustainability are open-ended and different authors highlight different goals, which shifts also depending on different agents and their interests. There is also a difference between the concepts' main motivation. The motives behind sustainability is based on past trajectories and reflexion, but CE is based on the motivation that resources could be used better and without leakages. Different motives seem to prioritize different beneficiaries. CE seems to prioritize the primary benefits for the environment over the implicit social gains, while sustainability was treating these three dimensions as an equal and balanced system. (Geissdoerfer et al., 2016) Important to mention, that the focus of design policies and interventions differ between developed and developing countries. Rich countries can focus more on the environmental aspects of the policy, and developing countries focusing more on the social gains.

The difference between agencies are important too, in CE the influencers are the governments, companies and NGO, while when it comes to sustainability the priorities should be defined by the stakeholders. Meanwhile sustainability's timeframe is open-ended, and the concept can be developed constantly, the CE's timeframe has some theoretical limits to optimisation and to implementation that can make the concept's permeation complicated. (Geissdoerfer et al., 2016) From the table (Tab.5), it can be seen the responsibilities and the commitments are strongly connected. The responsibilities in the concept of sustainability are not clearly defined and not in a hand of one single agency and their commitments are aligned by the stakeholders. Private businesses and regulators/policymakers are the responsible actors and their commitments are

mainly connected to economic and financial advantages for companies and less resource consumption and pollution for the environment.

	SUSTAINABILITY	CIRCULAR ECONOMY
ORIGINS OF THE TERM	Environmental movements, NGOs, non-profit and intergovernmental agencies, principles in silviculture and cooperative systems	Different schools of thought like cradle-to-cradle, regulatory implementation by governments, lobbying by NGOs like the EMF, inclusion in political agendas, e.g. Europe Horizon 2020
GOALS	Open-ended, multitude of goals depending on the considered agent and her interests	Closed loop, ideally eliminating all resource input into and leakage out of the system
MAIN MOTIVATION	Diffused and diverse reflexivity and adaptive -> past trajectories	Better use of resources, waste, leakage (from linear to circular)
WHAT SYSTEM IS PRIORITISED?	Triple bottom line (horizontal)	The economic system (hierarchical)
TO WHOSE BENEFIT?	The environment, the economy, and society at large	Economic actors are at the core, benefitting the economy and the environment. Society benefits from environmental improvements and certain add-ons and assumptions, like more manual labour and fairer taxation
HOW DID THEY INSTITUTIONALISE (WIDE DIFFUSION)?	Providing vague framing that can be adapted to different contexts and aspirations	Emphasising economic and environment benefits.
AGENCY (WHO INFLUENCES? WHO SHOULD INFLUENCE?)	Diffused (priorities should be defined by all stakeholders)	Governments, companies, NGOs
TIMEFRAME OF CHANGES	Open-ended, sustain current status "indefinitely"	Theoretical limits to optimisation and practical ones to implementation could set input and leakage thresholds for the successful conclusion of the implementation of a Circular Economy
PERCEPTIONS OF RESPONSIBILITIES	Responsibilities are shared, but not clearly defined	Private business and regulators/policymakers
COMMITMENTS, GOALS, AND INTERESTS BEHIND THE USE OF THE TERM	Interest alignment between stakeholders, e.g. less waste is good for the environment, organisational profits, and consumer prices	Economic/financial advantages for companies, and less resource consumption and pollution for the environment

Table 5.: Selected differences between sustainability and the Circular Economy –(Adapted from (Geissdoerfer et al., 2016))

These differences and similarities define the possible relationship between sustainability and CE. The possible relationships between the two concepts are shown in Tab. 6. There are three types of general direction in their relationships: conditional, beneficial and trade-off.

Conditional relationship can be a conditional relation – where closed loop systems are seen as one of the conditions for a sustainable system. Circularity is the precondition for sustainable manufacturing.
The second types of relationship are strong conditional relation – where closed loops are the main solution for a transformation and circularity considered necessary for sustaining economic output.
The necessary but not sufficient conditional relation – where closed loops, circularity and service-based systems are necessary but not sufficient condition for a sustainable system.

Beneficial direction has also three types of relationships. The beneficial relationship identifies a system that is profitable for different sustainability dimensions like job creation, GDP growth. The second type of relationship is the subset relation (structured and unstructured) in which circularity is seen as an option to foster sustainability of a system.

The third type of it is the degree relation where the degree of the sustainability is influenced with other concepts.

GENERAL DIRECTION	TYPE OF RELATIONSHIP	SHORT DESCRIPTION - CIRCULARITY/CLOSED LOOP ARE SEEN AS...	EXAMPLES IN LITERATURE	GRAPHICAL REPRESENTATION
CONDITIONAL	Conditional relation	One of conditions for sustainable system	Lapple, 2007 Rashid et all, 2013	A → B
	Strong conditional relation	The main solution for a transformation to a sustainble system	Bakker et al, 2014 EMF, 2013b UNEP, 2006	A ➡ B
	Necessary but not sufficient conditional relation	A necessary but not sufficient condition for a sustainable system	Nakajima, 2000	
BENEFICIAL	Beneficial relationship	Beneficial in terms of sustainability, without referring to conditionality or alternative approaches	European Commission, 2014	+A → +B
	Subset relation (structured and unstructured)	One among several solutions for fostering a sustainable system	Allwood et al, 2012 Bocken et al, 2014 Evans et al, 2009 Bocken et al, 2017	
	Degree relation	Yielding a degree of sustainability with other concepts being more and/or less sustainable	OECD, 2009	
TRADE-OFF	Cost-benefit/trade-off relation	Having costs and benefits in regard to sustainability, which can also lead to negative outcomes	Allwood, 2014 Andersen, 2007	
	Selective relation	Fostering certain aspects of sustainability but lacking others	Murray et al, 2015	

Table 6.: Relationship types between the Circular Economy and sustainability – (Adapted from (Geissdoerfer et al., 2016))

Important to mention the negative relationships also, the trade-off direction. One of them is the cost-benefit/trade-off relation that assumes that having costs and benefits in regard to sustainability can also lead to negative effects.
The selective relation is about fostering some aspects of the sustainability but lacking others, which cannot lead truly sustainable companies or CE change.

The relationship between the possible relationship if the concepts was not only examined by Geissdoerfer et al (2016) Kirchher et al's 9R (Tab. 7) framework adapted from Potting el al (2017) describes the steps and the phases of the transition from linear economy to circular. The figure shows how making productions more sustainable and moving from linear economy towards circular economy can have an impact on the loops. In the sense of slowing, narrowing and closing them. However, to be able to decide if this framework is useful for the implementation or clarifies the terms, more real-life implementation is needed. The 9R framework gives the principles and foundation for different CEBMs and transitional models. Based on that, companies can see where they are in the process of transition.

The limitations of the concept have been defined by Korhonen, Honkasalo and Seppälä (2018).

However, before that their paper suggests that CE is for sustainable development and based on that they suggested a new definition for CE:

> *"Circular economy is an economy constructed from societal production-consumption systems that maximizes the service produced from the linear nature-society-nature material and energy throughput flow. This is done by using cyclical material flows, renewable energy sources and cascading-type energy flows. Successful circular economy contributes to all the three dimensions of sustainable development. Circular economy limits the throughput flow to a level that nature tolerates and utilises ecosystem cycles in economic cycles by respecting their natural production rates."* **(Korhonen et al., 2018)**

In their paper, the authors defined the environmental, economic and social wins of the concepts on the input and on the output side as well. It can be seen in Fig.6.

From the figures can be seen that not just a new consumption culture, but also new approach to the economy and new business model approaches. New business concepts should include leasing and renting, the foundations of a sharing economy. This could bring new ways of consuming, for example how we live, organize our travel accommodation and our travels. The concept concentrates around using the already existing material capacity, instead of using new/fresh/virgin materials and resources.

		Strategies	
Circular Economy ↑ Increasing circularity ↓ Linear Economy	Smarter product use and manufacture	**R0 REFUSE**	Make product redundant by abandoning its function or by offering the same function with a radically different product
		R1 RETHINK	Make product use more intensive (e.g. by sharing product)
		R2 REDUCE	Increase efficiency in product manufacture or use by consuming fewer natural resources and materials
	Extend lifespan of product and its parts	**R3 REUSE**	Reuse by another consumer of discarded product which is still in good condition and fulfils its original function
		R4 REPAIR	Repair and maintenance of defective product so it can be used with its original function
		R5 REFURBISH	Restore an old product and bring it up to date
		R6 REMANUFACTURE	Use parts of discarded product in a new product with the same function
		R7 REPURPOSE	Use discarded product or its parts in a new product with a different function
	Useful application of materials	**R8 RECYCLE**	Process materials to obtain the same (high grade) or lower (low grade) quality
		R9 RECOVER	Incineration of material with energy recovery

Table 7.: The 9R framework. Source: adapted from Potting et al (2017, p.5.) – (Adapted from (Kirchherr, Reike, & Hekkert, 2017))

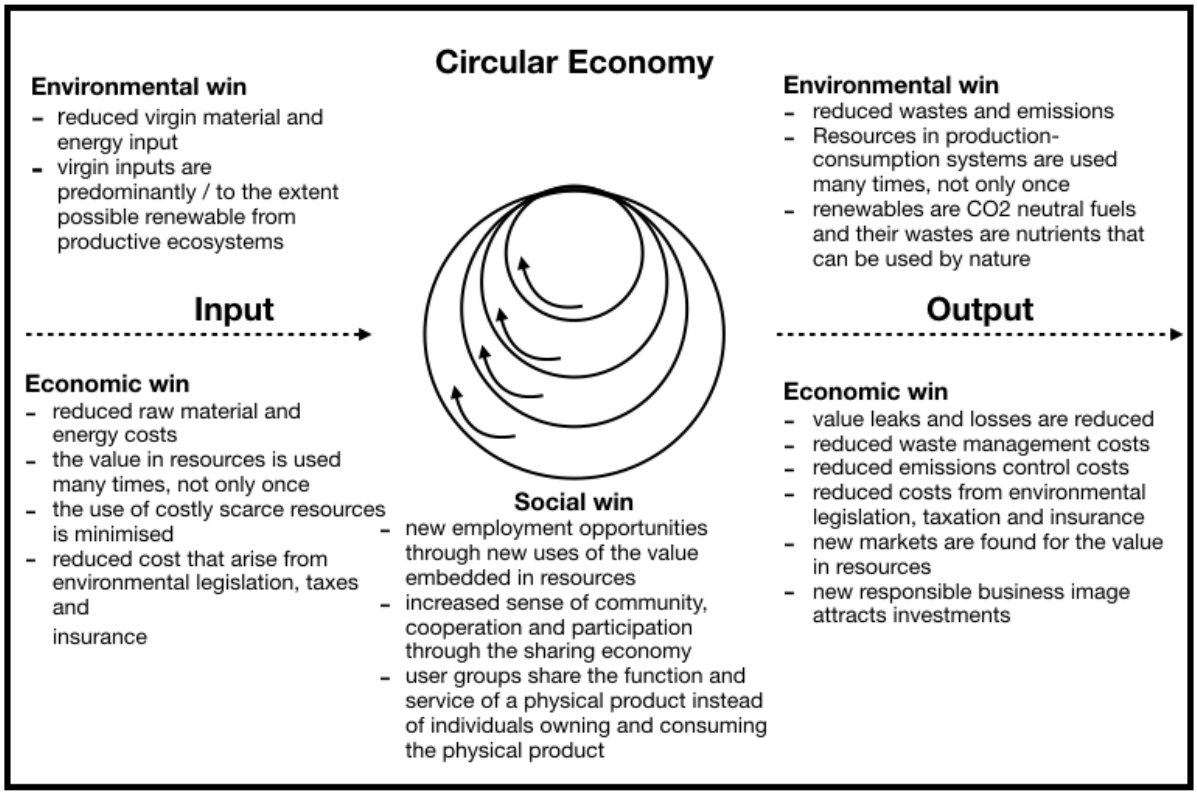


Figure 6.: Circular economy for sustainable development. The win-win potential of circular economy. The paper suggests that successful circular economy contributes to all the three dimensions of sustainable development, economic, environmental and social. Circular economy should adapt to the natural ecosystem cycles and utilize these economic cycles by respecting their reproduction rates – (Adapted from (Korhonen et al., 2018)

Consumer efforts and a changed way of looking at used resources or material capacity is needed for a successful circular economy. The economics of objective of the concept of CE is to reduce the use of raw materials and reduce energy costs, waste and emission, just as emission control costs and risks from (environmental) legislation/taxation and public image as well as to innovate new product designs and market opportunities for businesses. The social objective is increased employment, participative democratic decision-making and more efficient use of the existing physical material capacity through a cooperative and community user as opposed to a consumer culture.

According to Korhonen et al.'s (2018) paper, there are six limitations (Tab.8) of the concept and many key questions are still open, so there is a chance that there are more or less than six. It depends on the approach and the carry out of the concept.

There are thermodynamical limits, system boundary limits, limits posed by physical scale of the economy, by path-dependency and lock-in, limits of governance and management, and limits of social and cultural definitions. (Tab. 8)

The concept of waste is already dynamic among different cultures and societies that comes with different understandings. However, the different concepts and definitions are not clarified yet either and because of these, the implementation of the concept is different in every culture. The concept pushed the business community to work toward sustainable development. For starter,

it makes sense if one used extracted a resource from nature and work hard for it to become a product or a service that has an economic value, then is it natural that one uses this value many times, not just once. Additional to that, if one uses once, the value is already embedded, so reducing the input of virgin materials and waste and emissions output of the economic activity. Using the example of the global natural ecosystem which is materially closed and runs entirely renewable solar energy and the only waste is the waste heat which means infrared radiation to space.

THERMODYNAMIC LIMITS
- Cyclical systems consume resources and create wastes and emissions
SYSTEM BOUNDARY LIMITS
- Spatial: problems are shifted along the product life cycle
- Temporal: short-term non-renewables use can build long-term renewable infrastructure
LIMITS POSED BY PHYSICAL SCALE OF THE ECONOMY
- Rebound effect, Jevon's paradox, boomerang effect
LIMITS POSED BY PATH-DEPENDENCY AND LOCK-IN
- First technologies retain their market position despite of in-efficiency
LIMITS OF GOVERNANCE AND MANAGEMENT
- Intra-organisational and intra-sectoral management of inter-organisational and inter-sectoral flows of materials and energy
LIMITS OF SOCIAL AND CULTURAL DEFINITIONS
- The concept of waste has a strong influence on its handling, management and utilisation
- The concept is culturally and socially constructed
- The concept of waste is always constructed in a certain cultural, social and temporal context and this context is dynamic and changing

Table 8.: Six limits and challenges for the circular economy concept –(Adapted from (Korhonen et al., 2018))

CE model seems to follow the example of the nature in the terms of physical flows of material and energy. Many scholars already referred to the natural ecosystem and energy flow model in terms of human economic sustainability.

3.6 Business Model research

A Business Model represents all the strategic decisions that defines how companies create and capture value. (Urbinati, Chiaroni, & Chiesa, 2017) Chesbrough and Rosebloom (2002) define the functions of a business model in their study and describe it as a framework what mediates between the technical and economic domains. A business model should articulate value proposition, identify market segment, define the structure of the value chain, estimate the cost and profit potential of producing. They should describe the position of the company within the value chain and they should formulate the competitive strategy by which a business can gain advantage and hold over its rivals. Value creation is necessary, but not sufficient for a firm to profit from its business model. Important to mention that business model and the strategy of a

business is not the same, Chesbrough and Rosenbloom (2002) defined three differences.(Chesbrough & Rosenbloom, 2002) The emphasis on value capture and sustainability is stronger in the strategy. There is difference between creating value for the business and creating value for the shareholders and lastly the assumption made about the knowledge by the firm, the customers and by third parties. Which brings the paper to that the model requires linking the physical domain to an economic one in continuous uncertainty. (Chesbrough & Rosenbloom, 2002) The link can be seen in Fig. 7. A business model evaluation can be based on its attributes, for example: identified market segment, clear value proposition, elements of value chain, defined cost and profit, positioned in value network, formulated competitive strategy.

Moving on from Chesbrough and Rosebloom (2002), Zott and Amit (2007) analysed the fit between a firm's product market strategy and its business model (Tab. 9), to understand that they developed a model to analyse the effects of product market strategy and business model choices. There are no optimal strategy for every company. (Zott & Amit, 2008) Moreover, the most desirable choice of strategy depends on individual factors, elements. According to Zott and Amit (2008), the business model is a structural template of how a firm interacts with different stakeholders and how it chooses different markets. (Zott & Amit, 2008) It can be defined as the structure, the content and the governance of the transactions. Most importantly, business model can be the source of competitive advantage, because if multiple firms target the same customer and pursue similar market strategies, the business model is the only aspect or element where they can differ from other businesses on the market. The authors explained the differences between business models and product market strategy in a table.

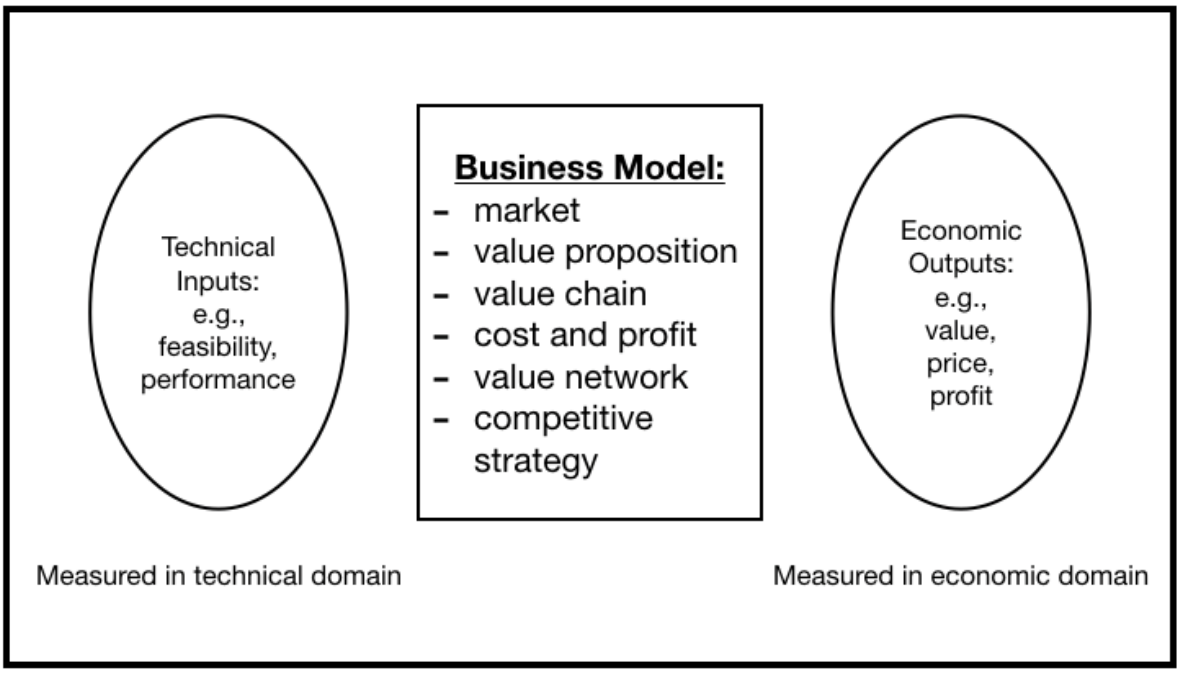


Figure 7.: The business model mediates between the technical and economic domains – (Adapted from (Chesbrough & Rosenbloom, 2002))

	BUSINESS MODEL	PRODUCT MARKET STRATEGY
DEFINITION	A structural template of how a focal firm transacts with customers, partners, and vendors. It captures the pattern of the firm's boundary spanning connections with factor and product markets	Pattern of managerial actions that explains how a firm achieves and maintains competitive advantage through positioning in product markets
MAIN QUESTIONS ADDRESSED	How to connect with factor and product markets	What positioning to adopt against rivals
	Which parties to bring together to exploit a business opportunity, and how to link them to the focal firm to enable transactions (i,e,:, what mechanisms to adoprt?)	What kind of generic strategy to adopt (i.e., cost leadership and/or differentiation)?
	What information or goods to exchange among parties, and what resources and capabilities to deploy the exchanges?	When to enter the market?
	How to control the transactions between the parties, and what incentives to adopt for the parties?	What products to sell? What customers to serve? Which geographic markets to address?
UNIT OF ANALYSIS	Focal firm and its exchange partners	Firm
FOCUS	Externally oriented: focus on firm's exchanges with others	Internally/externally oriented: focus on firm's activities and actions in light of competition

Table 9.: Business model and product market strategy – (Adapted from (Zott & Amit, 2008))

A business can be analysed by the connection between the model and the market strategy and how they can gain competitive advantage on a market. The connection leads the authors to propose the so-called 'corollary' that means that the business model is distinct from the product market strategy. However, the business model design themes and the product market strategy choices are not exclusive, there is a connection between them, but they both affect the firm's market value.

Based on Baden-Fuller and Morgan's research (Baden-Fuller & Morgan, 2010) who wrote about the taxonomy of business models is to provide a set of generic descriptions of how a firm organizes itself. The difference between taxonomy and typology is the first step to understand different concepts (Fig. 8.). Taxonomy is mainly about things what can be observer and being developed from bottom up, from empirical work. Typology is delineating different things, from top-down, mainly made by scientists. (Baden-Fuller & Morgan, 2010)
Business model can be seen as model organisms for investigation or as recipes. According to their study, the business models lie between principles and templates. (Baden-Fuller & Morgan, 2010) They used to demonstrate technology; they give hints or advice about how to do something so the target can be reached.
Business models can be found as an exemplar that can be copied or presented as a short description of a business organisation. They are simplified and shorthand descriptions. (Baden-Fuller & Morgan, 2010) Nevertheless, they can be investigated as an organism that stands as a representative for a class of things, but they can appear as schemas or representations that can be manipulated for a cause.

This does not mean that a model can only fulfil one of the mentioned roles above, but it can be all of them, depending on the purpose, the usage and the elements. This explains why the idea of a business model can be challenging to explain or grasp one focus.

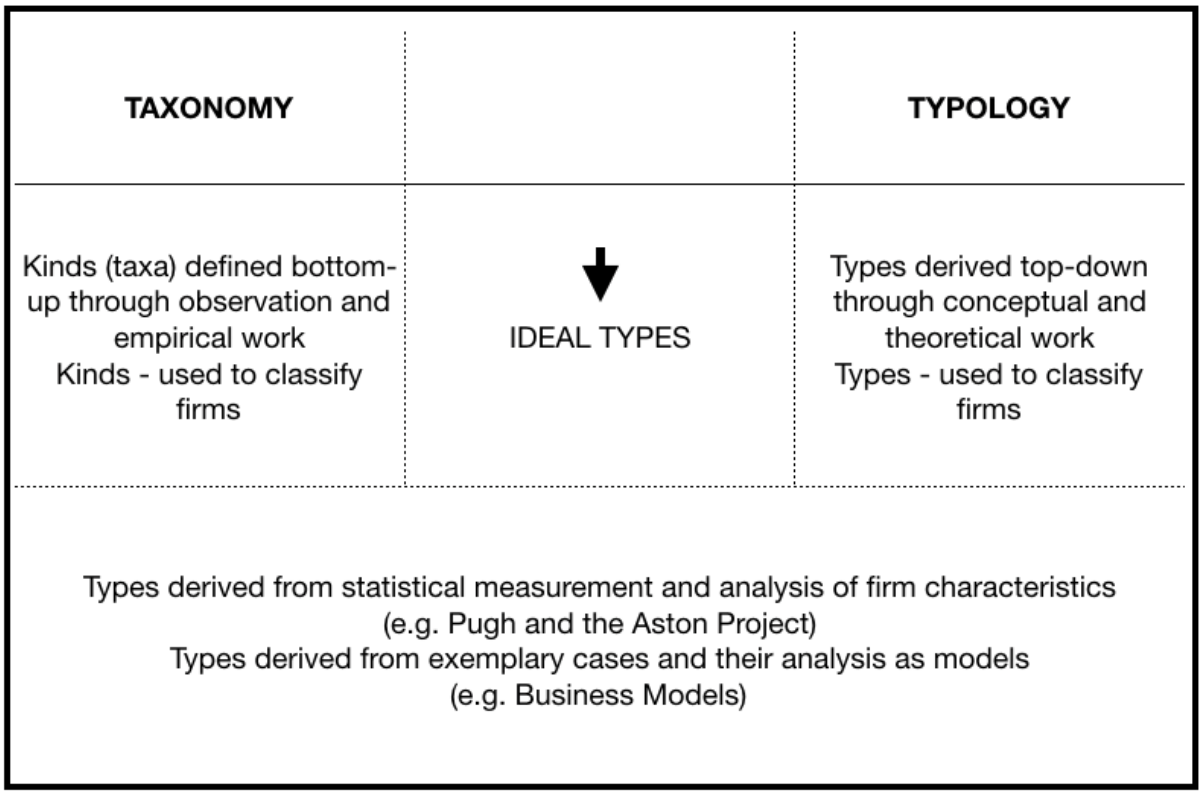


Figure 8.: Taxonomies, Typologies and Ideal Types – (Adapted from (Baden-Fuller & Morgan, 2010))

According to Ritter and Lettl (Ritter & Lettl, 2018) there are five streams of business model research who based on their paper on a previous research of Baden-Fuller and Morgan (2010). A business model can describe how a given actor chooses to connect with different markets. A construct connects technology development and value creation.
Figure 18 illustrates the five perspectives on business-model research and how they are complementary. Together they offer a comprehensive framework for understanding different organizations and possible strategies. Activities, resource transactions and transformations are the foundations of an organization Therefore; activities serve as the basis for understanding what a business does. (Ritter & Lettl, 2018)

These five perspectives are business-model activities, business-model logics, business-model archetypes, business-model elements and business model alignment.
Business-model activities are the descriptions of those activities what a firm has put together to reach their goals fit to their strategy. Business model logics are slightly different; they are about the reasoning behind a firm's activity and why they are doing what they are doing. Business-model archetypes are the generic logics how a firm does business, the typical model of these are the models of value creation and value capture. Business-model elements describe important

parts of a business, but part what has been found important differs among authors. The essence of a business could be captured through what a business does, what it offers and how the offer is made. The last one is the business-model alignment which describes how the different elements of a company does fit together. It is all connected in Figure 9.

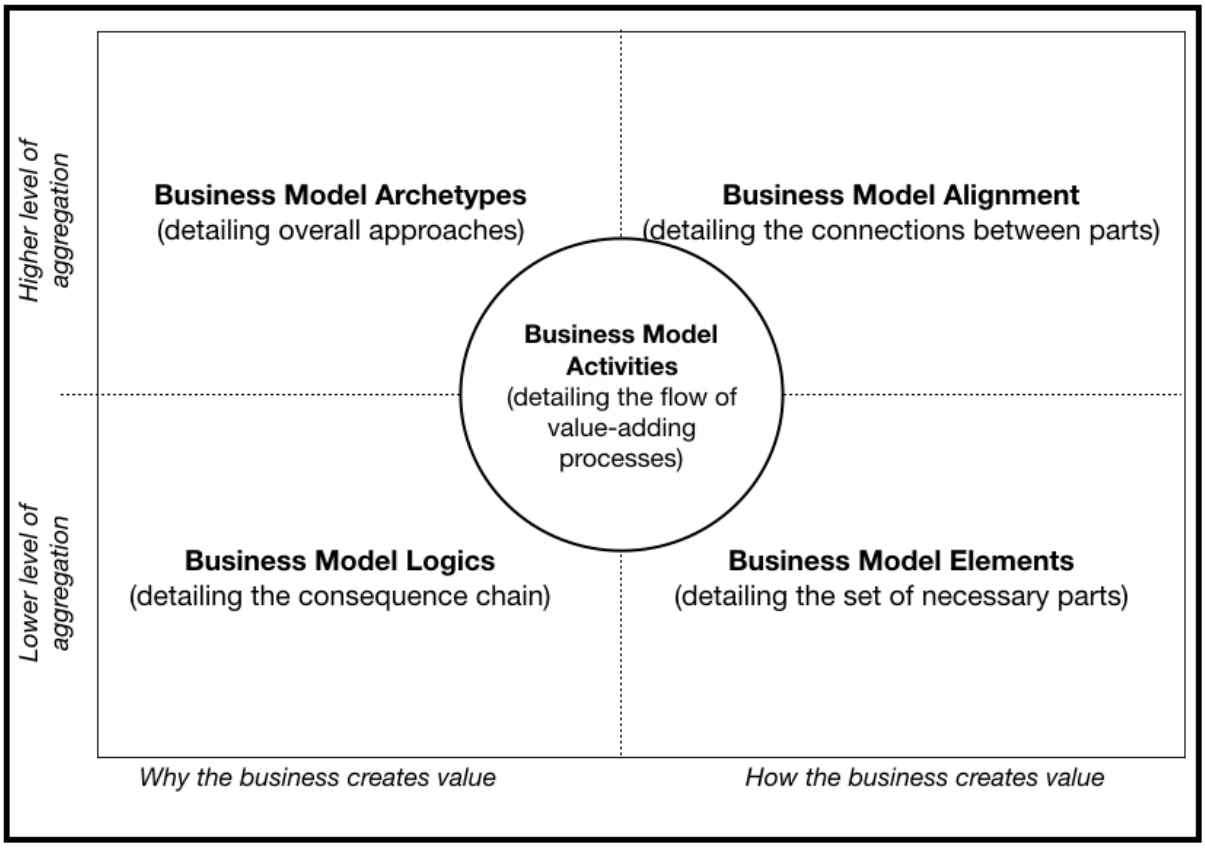


Figure 9.: Overview of five streams of business model research –(Adapted from (Ritter & Lettl, 2018))

However, the connection can be made differently. Ritter and Lettl (Ritter & Lettl, 2018) described business models in another way. They approached business model as a framework where different elements can be inserted and these elements are connected to each other, sometimes they have a strong linkage sometimes they have a weaker linkage among them.
They highlighted the prominent research streams to pinpoint connections. As the conclusion, they described business models as a semipermeable membrane. They need a glue what connects them, but in the same, it lets the ideas, changes flow through. Figure 10 shows the idea of business models as a membrane more understandable.

The ultimate goal a business model to ensure that the current innovation delivers value to the consumer. Discovery-oriented research often ends up with technologies without clear path to market and could be critical to value creation in technology. (Chesbrough & Rosenbloom, 2002)

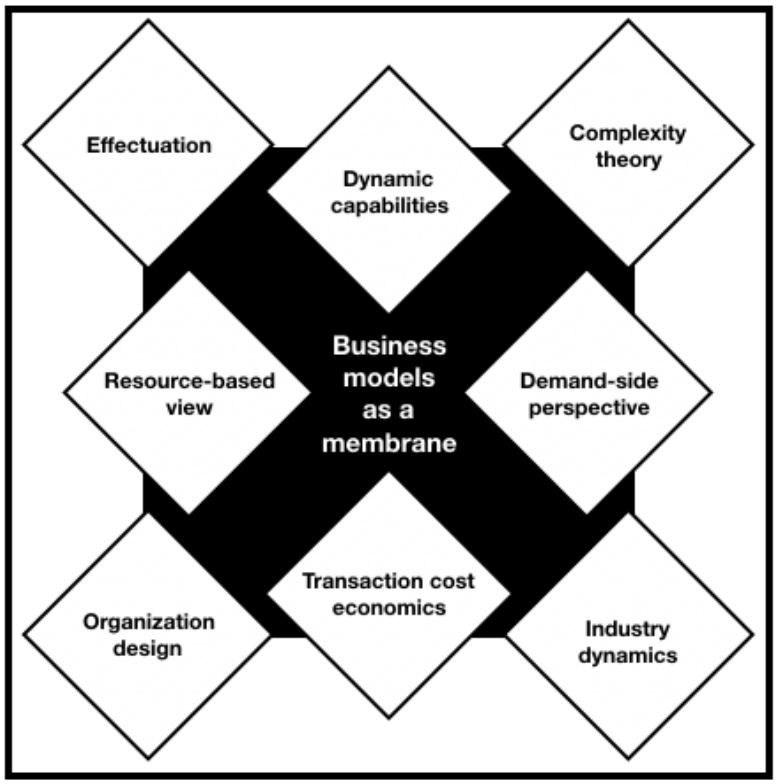


Figure 10.: Business models as a semipermeable membrane – (Adapted from (Ritter & Lettl, 2018))

However, it is important to see the structure of new business models from the customer perspective (Tab. 10) to be able to narrow it down the endless flow of different business models. Planing (2015) developed a table, where the business models have been categorized.
In the same time, a non-acceptance (Tab. 11) model had been developed too. From these model it can be seen what is important for the customer and how they can react for different values. Based on these tables, a firm can develop a new value proposition model and how its business model effects on the value proposition and the consumers' acceptance or non-acceptance. In the case of non-acceptance model (Tab. 11) what is influenced by the consumer behaviour or different factors, for example geographical distance or regulations and laws and what is the factor that can be influenced by the firm.

A business model already tells a lot about how the company creates, proposes and delivers and captures value. Understanding the business model helps to understand how a company can carry out innovations and how it can change its value chain.

To understand how a company can deliver innovations, the next sub-chapter (Chapter 3.6.1) explores the options of Business Model Innovation and the path towards designing a Sustainable Business Model (SBM). Understanding and designing sustainable Business Models helps in the transition and the design of Circular Economy Business Models, hence the two types of business models are strongly connected.

Business model category	Short explanation	Example	Source
Ownership-based business models	Customer purchase a product and owns it right away	Purchasing a washing machine	-
Access- or Usage-based business models	Customer purchases a certain usage period to a certain good	Leasing a washing machine for 12 months	Sempels, 2014
Performance-based business models	Customer purchases a defined performance, normally not bound to defined product	Leasing a washing machine for 1000 washing cycles	Cinquini, Di Minin and Varaldo, 2013
Result-based business models	Customer purchases a defined end result	Providing a pick-up and delivery washing service	Sempels, 2014

Table 10.: Structuring new business models from the customer perspective – (Adapted from (Planing, 2015))

Reason for non-acceptance	Short explanation	Origin
Customer irrationality	Customer only evaluate the transaction cost at the point of sale (purchase price) even if the net present value of upgrading to a more expensive but durable product would be more economical. Consumers prefer ownership of a product, even if temporary	Consumer behaviour
Conflict of interest within companies	Higher capital or cash required to change an existing product design or to move from sales-based to a usage-based revenue model	Short-term oriented corporate management
Misaligned profit-share along supply chain	Imperfect design at the beginning of the supply chain if the profits from a better design would only occur at the end-of-use phase	Lack of consistent legislation regarding end-of-life phase or products
Geographic dispersion	Since the value chain of today's product is spreading over multiple countries, national initiatives often lose their potential impact	Transnational authorities and lack of national collaboration

Table 11.: Reasons for "non-acceptance" of circular business model. Adapted from (Planing, 2015))

3.6.1 Business Model Innovation

Innovation of the business model can happen in many ways. Based on Chesbrough & Rosenbloom (2002) the business model is part of the market, but changes in the market does not depend on the business model, to have changes in that, the business model change should happen on an aggregate level, where every company puts the same effort and energy for the same cause. In the case of the study, this goal can be sustainability.
The innovation can happen on the level of the overall value chain or in the segment of the value proposition. The value proposition seems the easiest segment to have an innovation and change the current business model. If there is a change in the value proposition, it is followed by cost and profit changes, and changes in the competitive strategy.
The push and pull in the case of the innovation can be technology push and market pull.
In the case of the streams of the business models, the innovation can happen on the level of the BM archetypes, alignment, logics and elements or in the overall activities. (Fig. 9)
However, if business model is seen as a semipermeable membrane every change can be considered as an innovation that influences the other segments of the model.

The customers have a role in the innovation too, if they cannot accept the innovation or the change as an innovation then it is not working. The reasons of the non-acceptance can be the irrationality of the customer. The reason of non-acceptance in the perspective of the company can be the conflict of interest within the company, the misaligned profit-share along the supply chain and the geographic dispersion. (Tab. 11)

3.7 Sustainable Business Models

Sustainable business model (SBM) incorporate a triple bottom line approach while it takes into considerations many stakeholder interests. (N. M. Bocken, Short, Rana, & Evans, 2014)
The introduced archetypes from Bocken et al. (2014) (Tab. 12) help to describe mechanisms and develop solutions to contribute to build sustainable businesses. The 8 archetypes what they defined are: maximise material and energy efficiency, create value from waste, substitute with renewables and natural processes, deliver functionality rather than ownership; adopt a stewardship role; encourage sufficiency; repurpose the business for society/environment; and develop scale-up solutions. (N. M. Bocken et al., 2014)

To develop SBM, sustainable economy is needed too and towards it, the step could develop a system that minimises consumption or imposes quotas. A system that is designed to maximise societal and environmental benefit, a closed-loop system, a system that emphasized functionality and experience. A system that provides fulfilling and rewarding work experiences what can enhance creativity/skills and last but not least, a system what built on collaboration and sharing.

Business models and business model innovation represented as the key to business success. Business model innovations are those processes which create significant positive or reduced

negative impacts for the environment or/and for the society and through these changes the organization can create, propose and deliver value. (N. M. Bocken et al., 2014)

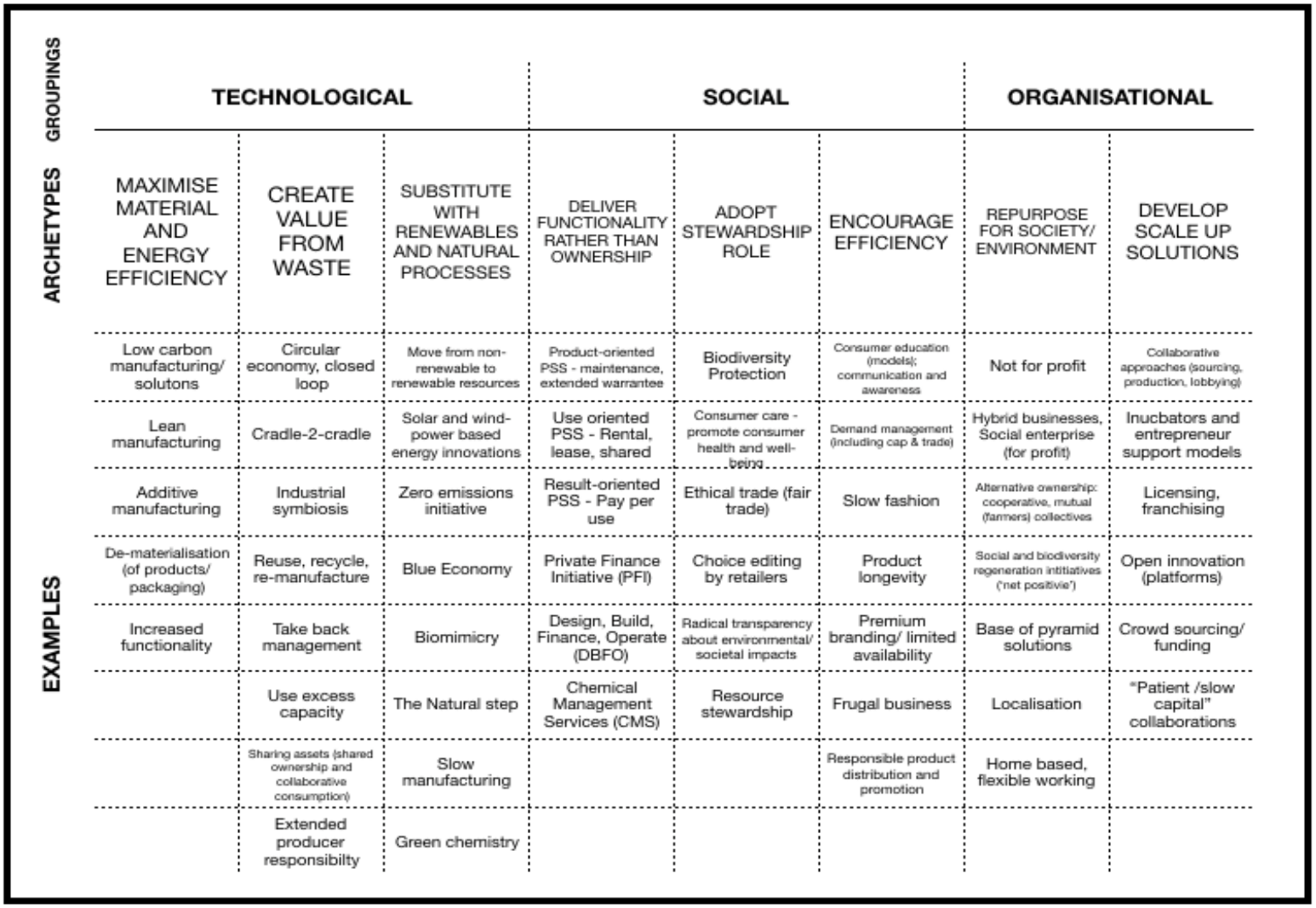
In their research, Bocken et al. (2014) developed a methodology to visualize the development of SBM. Each archetype can be discussed in detail related to its value creation, value proposition and delivery and value capture. The archetypes can help each business to understand SBM and create and deliver sustainable value, each can be applied individually and in isolation but combination is needed to achieve real sustainability. However, the role of advancement and innovation, the application of systems perspective, innovation approaches to collaboration, the need for education and raising awareness are needed for the successful adoption of SBM.

However, developing archetypes is not enough to change the traditional business model to a sustainable one. The connections between different fields is important to understand. Lüdeke-Freund and Dembek (2017) tried to find an answer to that if SBM is really a step forward and a field or just a trend.

There is a significant push from the society that concerns SBM issues and the different elements of it start to exchange knowledge. These issues are acknowledged by authorities and are risen on a level of policymaking. They have a platform to discuss the issues, they have resources to conduct deeper research and their discussions are about beliefs and concepts, but the final stage of theorisation have not reached yet, it needs to be the part of the institutialisation processes. SBM research and practice is half-baked yet, but is in emerging field. (Lüdeke-Freund & Dembek, 2017)

Researchers and different stakeholders should participate in these processes to develop the best solutions to urging issues and keep monitoring the current situation. A generalized, but easily adaptable toolkit could help to understand the most crucial points and fields in sustainability and sustainable development that can be applied on the level of business models.

Table 12 introduces some examples related to the different archetypes. When it comes to social change and social archetypes, delivering functionality rather than ownership can be embedded in the principles of circular economy (CE) that is about offering products and services without owning them. For example, it can be extended warrantee or renting instead of owning a product or paying per use.
Adopting a stewardship is significant in CE, because if one company forces the others and the actors in the supply chain to carry out change, then the concept is going to be part of the discourse. A company can be a pioneer in biodiversity protection or in consumer care or in ethical trade.
The third archetypes is encouraging efficiency through education, communication and awareness, demanding management profiles, longer product lifecycles and responsible production and distribution.



GROUPINGS	TECHNOLOGICAL			SOCIAL			ORGANISATIONAL	
ARCHETYPES	MAXIMISE MATERIAL AND ENERGY EFFICIENCY	CREATE VALUE FROM WASTE	SUBSTITUTE WITH RENEWABLES AND NATURAL PROCESSES	DELIVER FUNCTIONALITY RATHER THAN OWNERSHIP	ADOPT STEWARDSHIP ROLE	ENCOURAGE EFFICIENCY	REPURPOSE FOR SOCIETY/ ENVIRONMENT	DEVELOP SCALE UP SOLUTIONS
EXAMPLES	Low carbon manufacturing/ solutons	Circular economy, closed loop	Move from non-renewable to renewable resources	Product-oriented PSS - maintenance, extended warrantee	Biodiversity Protection	Consumer education (models); communication and awareness	Not for profit	Collaborative approaches (sourcing, production, lobbying)
	Lean manufacturing	Cradle-2-cradle	Solar and wind-power based energy innovations	Use oriented PSS - Rental, lease, shared	Consumer care - promote consumer health and well-being	Demand management (including cap & trade)	Hybrid businesses, Social enterprise (for profit)	Inucbators and entrepreneur support models
	Additive manufacturing	Industrial symbiosis	Zero emissions initiative	Result-oriented PSS - Pay per use	Ethical trade (fair trade)	Slow fashion	Alternative ownership: cooperative, mutual (farmers) collectives	Licensing, franchising
	De-materialisation (of products/ packaging)	Reuse, recycle, re-manufacture	Blue Economy	Private Finance Initiative (PFI)	Choice editing by retailers	Product longevity	Social and biodiversity regeneration intitiatives ("net positivie")	Open innovation (platforms)
	Increased functionality	Take back management	Biomimicry	Design, Build, Finance, Operate (DBFO)	Radical transparency about environmental/ societal impacts	Premium branding/ limited availability	Base of pyramid solutions	Crowd sourcing/ funding
		Use excess capacity	The Natural step	Chemical Management Services (CMS)	Resource stewardship	Frugal business	Localisation	"Patient /slow capital" collaborations
		Sharing assets (shared ownership and collaborative consumption)	Slow manufacturing			Responsible product distribution and promotion	Home based, flexible working	
		Extended producer responsibilty	Green chemistry					

Table 12.: The sustainable business model archetypes - (Adapted from (N. M. Bocken et al., 2014))

In their research paper, they made two assumptions. One treats SBM as a subfield (Fig. 11) and one treats SBM as a stand-alone (Fig.12) hypothesis.
The first one (Fig 11) assumes, that SBM is part of the traditional business model and corporate sustainability field.
The second one (Fig.12) assumes that beliefs and concepts, tools and resources and communities of practice are sufficiently developed to delineate the boundaries, but stay independent from other fields.(Lüdeke-Freund & Dembek, 2017)
They introduced a third one, a hypothesis (Fig.13) that is about locating SBM as a field that depends on a business model field but in the same time it goes beyond that. Fig. 13 can be a good beginning of building a circular economy business model, because it is based on integration and interconnectedness. Even though each step, to the integration hypothesis shows some level of interconnectedness, but in Fig. 13 the traditional business model field, the corporate sustainability field, the design field and the X field are overlapping with the sustainable business model field while they are having an impact on each other as interconnected segments.

These figures can show the possible relationship between the different fields of the traditional business model in the terms of the sustainable business model. These connections are helpful to see how one can move towards circular economy.

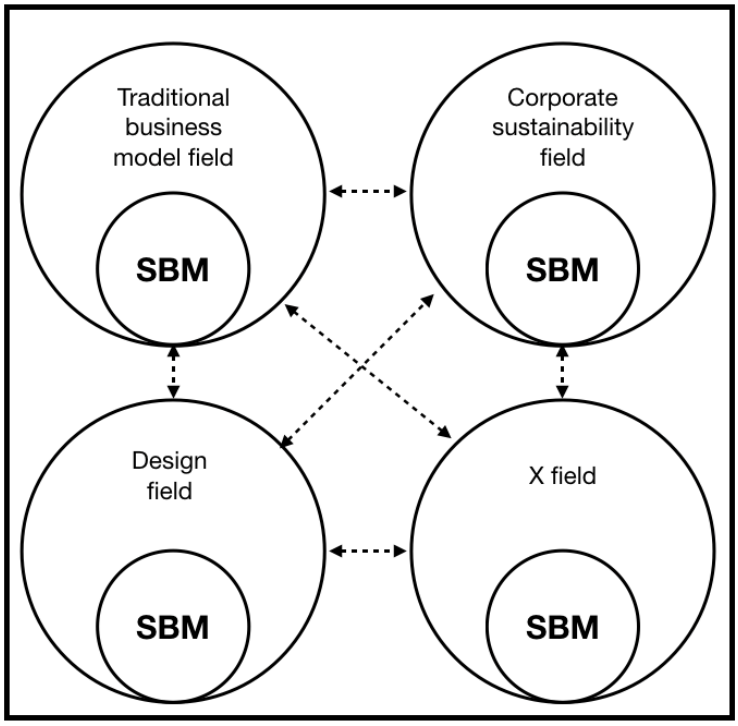


Figure 11.: Sub-field hypothesis: Locating the emerging sustainable business model field as a niche within already established fields - (Adapted from (Lüdeke-Freund & Dembek, 2017))

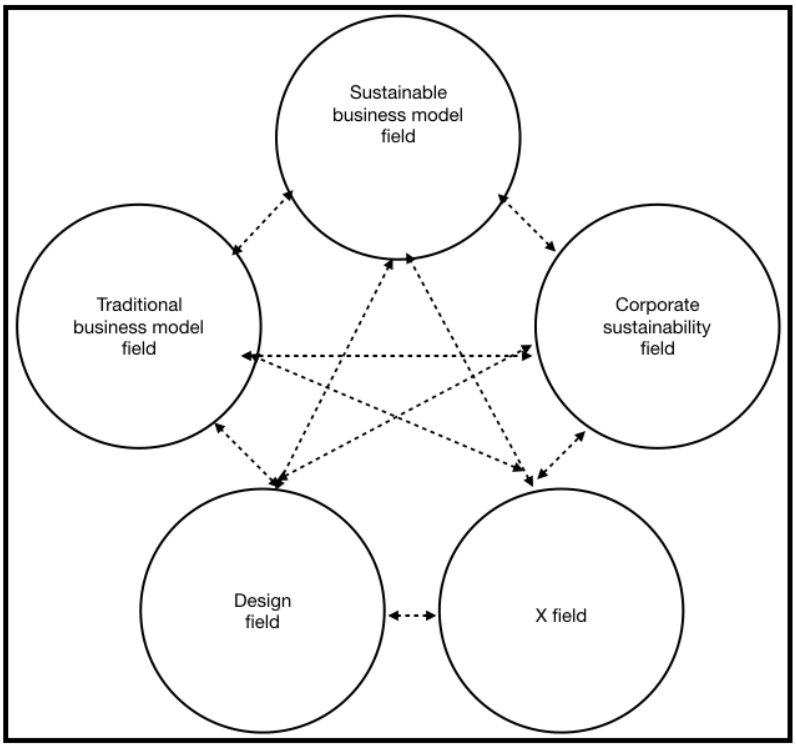


Figure 12.: Stand-alone hypothesis: Locating the emerging sustainable business model field as a field in itself, distinct from established fields. (Lüdeke-Freund & Dembek, 2017)

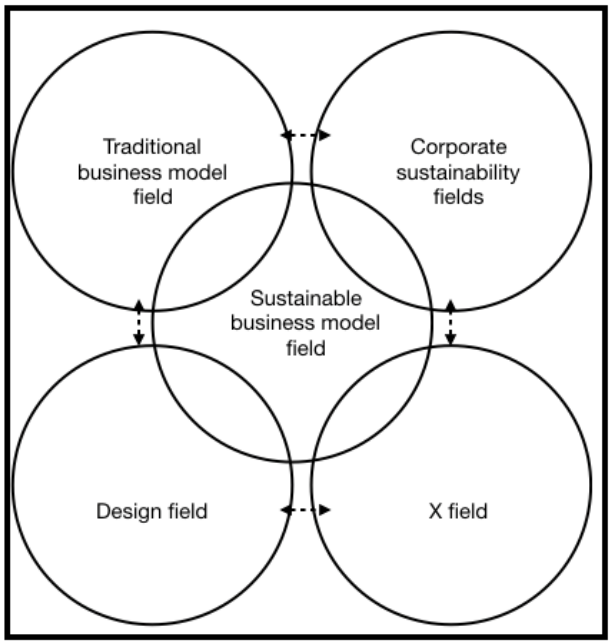


Figure 13.: Integration hypothesis: Locating the emerging sustainable business model field as a field that depends on but at the same time goes beyond established fields - (Adapted from (Lüdeke-Freund & Dembek, 2017))

Another article, written by Evans et al. (2017), writes about the challenges of SBM. It is important to understand the challenges of SBM to be able to move forward to a more circular economy. According to Evans et al. (Evans et al., 2017) there are six challenges for creation of SBMs. These are the so-called triple bottom line, mind-set, resources, technology innovation, external relationships and business modelling methods and tools. SBM can be achieved through

business model innovation, not necessary through technology, products or service innovation. One of the cores of a SBM is creating sustainable value what lies on the meeting point of environmental value, economic value and social value. Its value network lies within the traditional value network, but individual goals and common achievements can be enhanced by governmental decisions and mechanisms. The first step towards innovation is to rethink the firm's value network. (Evans et al., 2017) Evans et al.'s (2017) model shows (Fig. 14) how to balance between different value forms but it assumes that each sub-system is healthy, which is really hypothetical. If every subsystem were healthy, it would mean that the firm is not motivated to innovate, because they do not have the reason. The firm can create, propose and deliver value with healthy subsystems, so innovating its business model would be unnecessary. Sustainable value built up form environmental, social and economic value forms.

Evans et al. (2017) elaborated two implications for firms considering the implementation of SBM. One of them is the experimentation with the system and the other one is assessing the impact of the innovation. Many researcher suggests that experimenting with these models are important to recognize the possible gaps and failures in the system. Assessing the impact and the value creation potential is dependent of each firm's individual business model and value creation. Important to mention, that sustainability does not stop at the boundaries at each firm, to be successful the whole network should be sustainable. The entire set of stakeholder relationships should be successfully sustainable for the long-term success and survival.
Implication for research, implications for business strategy and implications for policy.

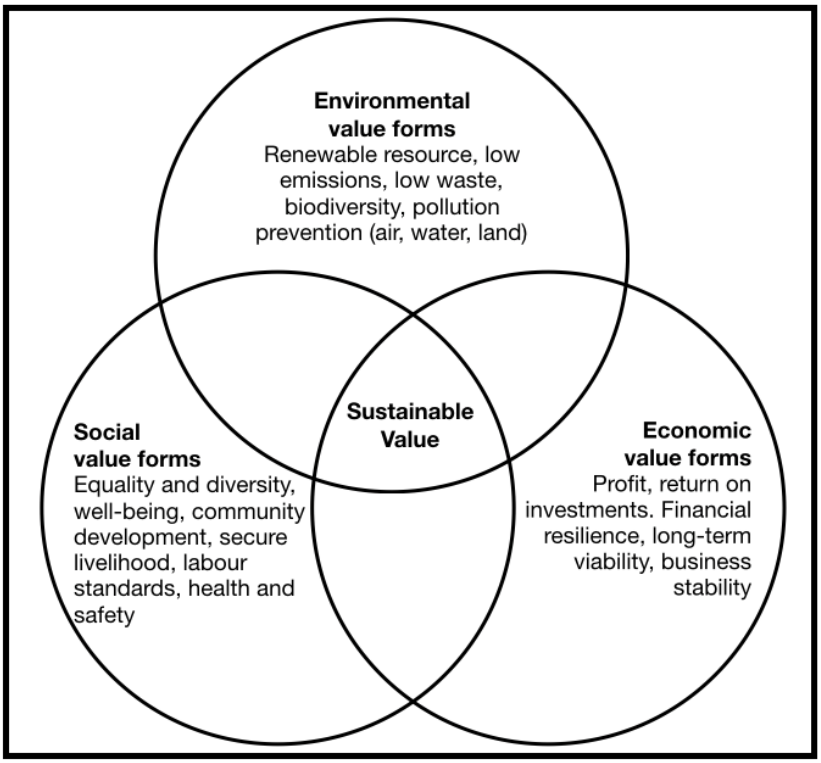


Figure 14.: Sustainable Value - (Adapted from (Evans et al., 2017))

3.8 Circular Economy Business Models

Business models typically show how a business creates value, how the value is to be delivered to consumers, how the value is created and how companies capture the part of the created value. Kraaijenhagen at el. (2016) introduced 10 steps for small, medium-sized and large organizations to approach circular business model (Fig. 15). A few decades ago, largely governments drove sustainability, but at the start of the 21st century, different organizations started taking their responsibility and developing sustainably solutions, they looked at sustainability as a competitive task, instead of a compulsory. These organizations tried to minimise their negative impact and doing things differently and better. Using waste as a resource initiated a new business model.

There are many economic benefits of moving towards a CEBM. According to Kraaijenhagen et al. (2016), one the first benefits is that the circular approach makes companies resilient to externalities (e.g. supply risks, expected fluctuating resource prices) because it maximises the value of products and materials through entire lifecycle. The relationship between organisations and consumers shifts from consumption (product-based) to use (performance-based), the circular economy has the potential to improve customer loyalty, secure revenue streams and generate new revenue streams by offering a range of service loops. (Kraaijenhagen et al., 2016) These moves can also produce great employment potential. It motivates the organization to seek innovations that can be beneficial for the whole company. There are different types of maturity levels of sustainability in business (Tab. 13.). There are five stages; these stages are being inactive, reactive, active, proactive and integral. Each stage represents different approach, external positioning of sustainability, external driving force. Which means that the reason to improve comes from outside. The internal positioning of sustainability is different as well, and the organizational capabilities for change too. The phase of the sustainability agenda differs between compliance, competition and market creation. Market creation is the highest level. In the perspective of circularity, there is only one stage, the fifth, which is the integral stage, where the stress is on innovation, differentiation, future position and sustainable transition.

The biggest limitation according to Kraaijenhagen et al.'s (2016) study is the cross-sector collaboration. It has a key role in transitioning towards a circular economy, a business or a sector cannot be circular on its own. Circular business approach has three key barriers what should be taken into consideration: mental, organisational and institutional. According to Kraaijenhagen et al. (2016), mental barriers are the most easily influenced by human action and institutional barriers the least. Mental barriers have been created by our own mind, it can prevent consumers to adopt circular thinking but it can help to accept it too. Organisational barriers are mental barriers ingrained to organizational systems. Institutionalized barriers are the mental barriers that became socially accepted and ingrained in terms of laws and regulations. (Kraaijenhagen et al., 2016)
There are four main aims in the categorisation of sustainable business model archetypes: (1) The first aim is to provide a means of categorising and explaining business model innovations for sustainability. (2) The second aim is to define generic mechanisms for actively assisting the business model innovation process for sustainability. (3) The third aim is to define a clearer

research agenda for business models for sustainability. (4) The fourth aim is to provide exemplars that explain and communicate business model innovations.

	STAGE 1: INACTIVE	STAGE 2: REACTIVE	STAGE 3: ACTIVE	STAGE 4: PROACTIVE	STAGE 5: INTEGRAL
EXTERNAL POSITIONING OF SUSTAINABILITY	Prevent condemnation	Advertising	Pollution prevention	Product stewrdship	Sustainable transition
EXTERNAL DRIVING FORCE	Minimise negative publicity	Consumer awareness	Minimise emissions, effluents and wastes	Minimise life-cycle cost of prodcuts	Differentiation and resource scarcity
COMPETITIVE ADVANTAGE	-	New consumers	Cost reduction	Pre-empt competitors	Future position
INTERNAL POSITIONING OF SUSTAINABILITY	Legal department	Communications department	Sustainability department	R&D	Strategy, innovation
ORGANISATIONAL CAPABILITIES NEEDED	Legal	Marketing and communications	Technical (internal) and operational excellence	Technical (external) and strategic	Innovation
PHASE OF SUSTAINABILITY AGENDA	Compliance →	Competition →		Market creation →	
APPROACH	Linear →				Circular →

Table 13.: Maturity model for sustainability in business - (Adapted from (Kraaijenhagen et al., 2016))

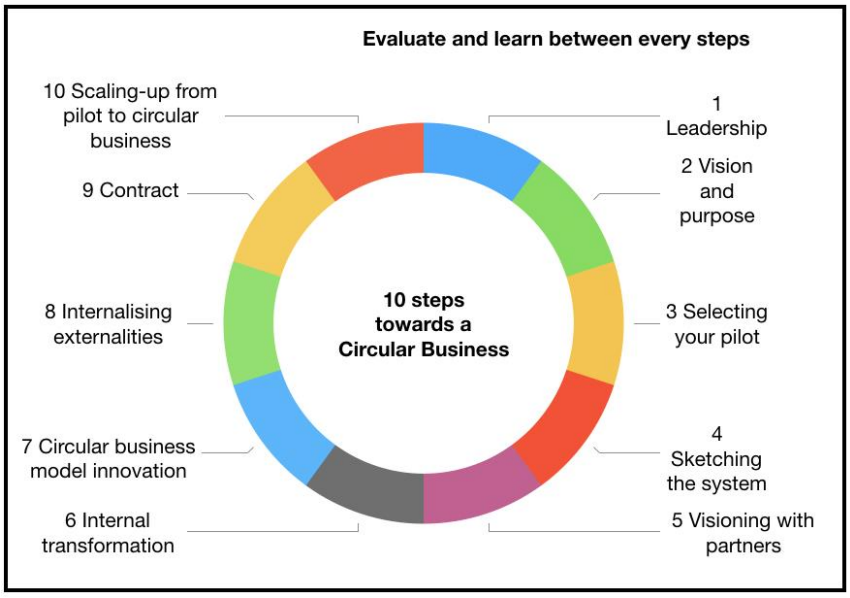


Figure 15.: 10 steps towards a circular business - (Adapted from - (Kraaijenhagen et al., 2016))

Kraaijenhagen et al. (2016) developed a 10 steps approach (Fig. 15.) is based on constant evaluation and learning between every step. It can be used to initiate change within an organisation, to select partner for a project, to manage collaboration and eventually scale up to

circular business. These ten steps are: 1) leadership, 2) vision and purpose, 3) selecting a pilot, 4) sketching the system, 5) visioning with partners, 6) international transformation, 7) circular business model innovation, 8) internalising externalities, 9) contract, 10) scaling up from pilot to circular business.

However, Kalmykova et al. (2018) developed a similar model to show the interactions between the different steps. Kraaijenhagen et al.'s (2016) model can be translated to Fig. 16.
These nine flows represent different strategies. For example, material sourcing could be about diversity and cross-sector linkages, energy production/energy autonomy or life cycle assessment. Design means customization, design for dissemble and recycling or reduction. Manufacturing implies energy efficiency, material productivity and reproducible and adaptable manufacturing. Distribution and sales means optimized packaging or redistribution. Consumption and use is about community involvement, eco-labelling, re-use, sharing and socially responsible consumption. Collection and disposal could mean extended producer responsibility (E.P.R.), incentivized building, separation or take-back and trade-in systems. Recycling and recovery means cascading, down-cycling, energy recovery, functional recycling, industrial symbiosis and upcycling. Remanufacturing means refurbishing or remanufacturing, but it can be about upgrading, maintenance and repair. Circular inputs can mean bio-based materials.
To sum up, these flows have different aspects and approach and a systemic economy-wide implementation should happen on three scales: macro-scale – which means city, province and state, the meso-scale – which means symbiosis association and the micro-scale that means the objects level. (Kalmykova, Sadagopan, & Rosado, 2018)

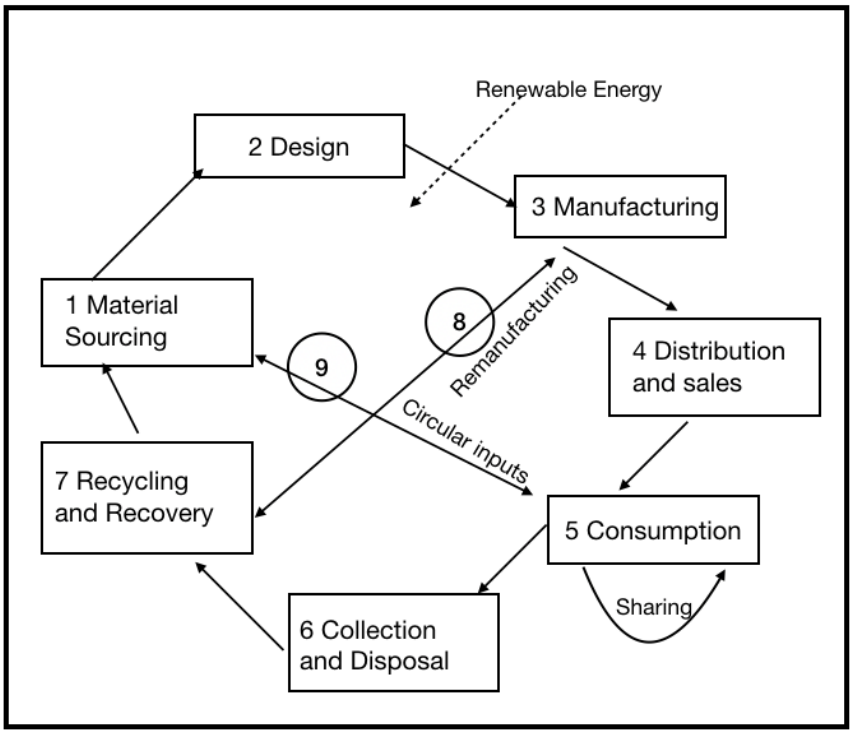


Figure 16.: Resource flows through a value chain in a circular economy. The numbers denote codes for parts of the value chain. - (Adapted from (Kalmykova et al., 2018))

There are different models that have been developed to categorise the business making of CE according to different value form, resource revenues and economic activities. De los Rios and Charnley (2017) tried to show the steps and connections (Fig.17) between materials and services. CE is mainly service based, but the renewed way of thinking is necessary to understand and change the already existing processes in recycling materials. In Fig. 18 the authors compared the CEBM to BAU (Business as Usual) and how material efficiency changes to sufficiency and the level of tangible product and how different business involvements bring changes in a product's life (Fig. 18)

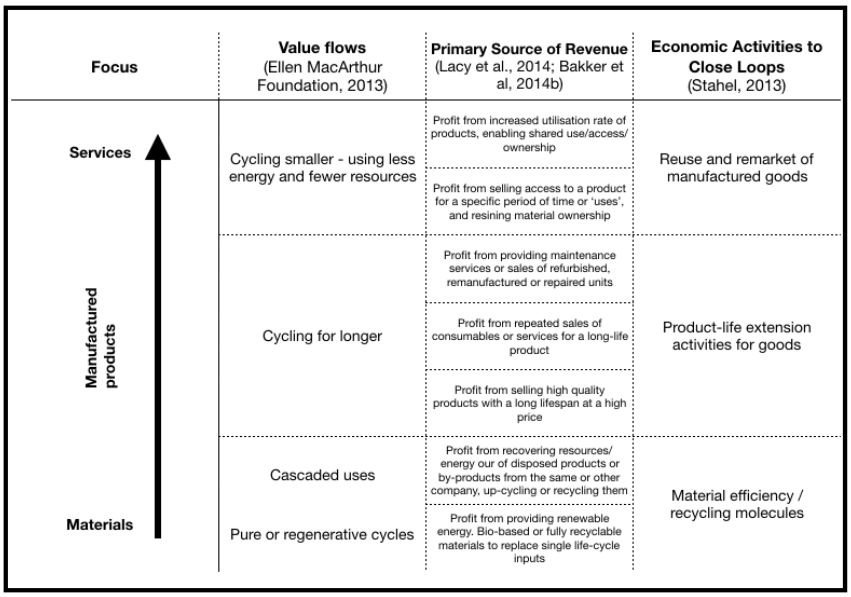


Figure 17.: Categorisation of business making for CE according to value form, sources of revenue and economic activities - (Adapted from (De los Rios & Charnley, 2017))

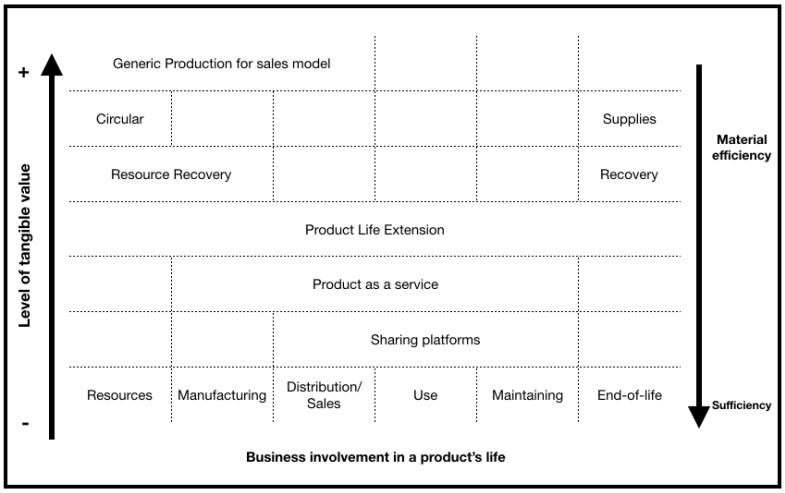


Figure 18.: Circular Economy business model compared to business-as-usual - (Adapted from (De los Rios & Charnley, 2017))

Urbinati et al. (2017) which introduced the criterion of characterization of customer value proposition and interference made another approach. Urbinati et al. (2017) introduced CE in companies' business model with the help of a table and criterions of different characterizations

(Tab.14). The four business model modifications are clustered into two dimensions in their Business Model Canvas. These modifications are a reverse supply chain, a product-offering system, changing relationship with customers that means higher number of interactions – mostly enabled by leasing and rental contracts and the last is the flow of revenues – transition toward "pay-per-own" to a "pay-per-use" approach. The Business Model Canvas introduced two major dimensions: customer value proposition and interface, and the value network, the degree of circularity of companies from a business model perspective. Additional to that, they developed a table in their article that shows the characterization of the value network. (Urbinati et al., 2017)

The different features of the value network are connected (Tab.15) to different degrees of circularity and how different focuses on different values can change the level of the circularity. The focus can shift from energy efficiency to materials or to design strategies or different implementation methods.
To sum up these tables, circular economy can be present in the value network, in the customer value proposition, and in the interface. Each approach represents a higher degree of circularity.

Based on Table 14-16, there are four available modes to adopt the principles of CE. These can be understood in a table where price/promotion, design for practices, customer value proposition and interface and value network present (Fig. 19). The following tables and figure show the relationships between the different approaches.

VARIABLES	FEATURES	DEGREE OF CIRCULARITY	MAIN REFERNCES
Price	Sale of products	Low	Williams, 2007
	Sale of products with additional complementary services (maintenance, financing, take-bake programs)	Medium - Low	Tukker, 2004, 2015 Tukker and Tischner, 2006
	Leasing/Renting	Medium - High	Mont, 2002
	Pay-per use or functional results	High	Stahel, 2016
Promotion	Information on companies website	Low	Kumar and Venkatesan, 2005
	Communication in store through advertising and sales personnel	Medium - Low	Baxendale et al, 2015
	Direct customer involvement in circularity initiatives	Medium - High	Rampton, 2015
	Communication of circularity through all channels	High	

Table 14.: Criterion of characterization of the customer value proposition and interference -(Adapted from (Urbinati et al., 2017))

FEATURES	DEGREE OF CIRCULARITY	MAIN REFERENCES
Focus on energy efficiency: reduction of emissions and environmental footprint	Low	Parkinson and Thompson, 2003
Focus on materials: natural, recyclable, durable, easy to separate	Medium - Low	Zhu et al, 2010
Focus on DfR, DfRe, DfD, DfE: modularity, standardisation, ease of disassembly, designed for recycling, LCA	Medium - High	Mayyas et al, 2012 Go et al, 2011
Focus on materials and implementation of one or more of DfX practices	High	Goldsworthy, 2014 Dagman and Sóderberg, 2012

Table 15.: Criterion of characterization of the value network - (Adapted from (Urbinati et al., 2017))

i) Reverse supply chain activities and higher degree of cooperation with the actors of the supply chain	ii) Transition from a "pay-per-own" to a "pay-per-use" approach	iii) Higher degree of cooperation between companies and customers	iv) Payment for use-oriented or result-oriented services
Value network	**Customer value propositions and interface**		

Table 16.: Circular Economy in companies' business model - (Adapted from (Urbinati et al., 2017))

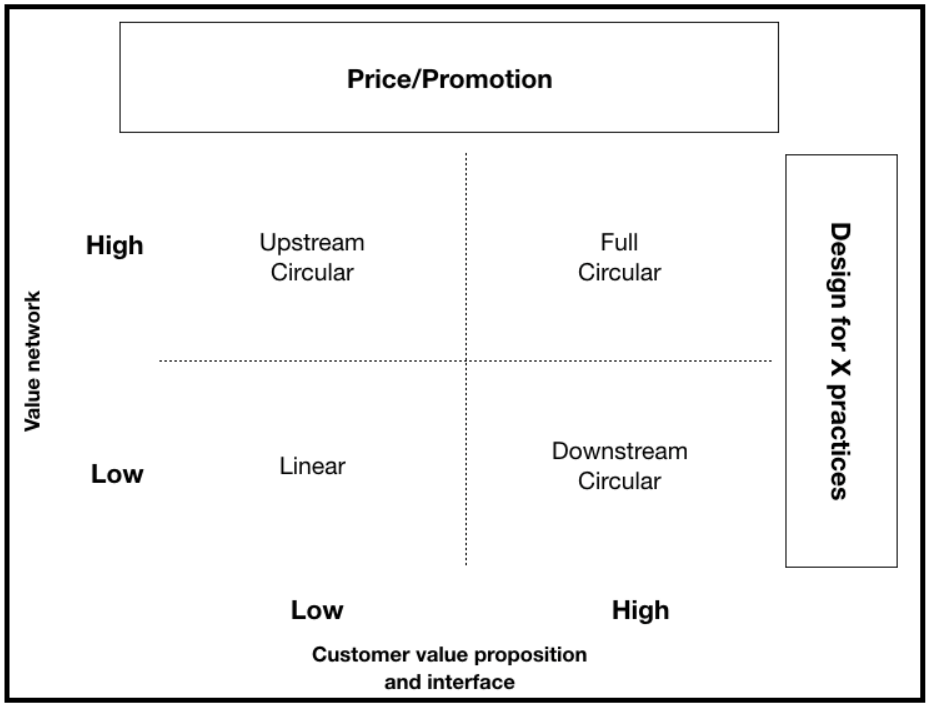


Figure 19.: The four available modes to adopt CE principles - (Adapted from (Urbinati et al., 2017))

In the model of Urbinati et al. (2017), the approach is based on the customer value proposition and interface compared to the value network.
In the Downstream Circular, the company should adopt a price scheme or marketing campaign based on using and reusing products, but the internal practices and design do not seem to reflect the characteristics of the circular approach. (Urbinati et al., 2017) In this way, the firm can focus on the market acceptance of the pay-per-use model while not relevant changes are made at level of the product. The Upstream Circular is the adoption of principles in the firm's product design activities and establishing in effective relationship with new suppliers, however, this is not visible for the customers or in the price or for the marketing strategy. This implies that these companies' advantage is tied to the cost efficiency. The Full Circular Adoption implies that a firm is circular both externally and internally. These firms manage the production system according to the principles of CE and the involvement of suppliers. Additional to these, the firm communicates the implementation of circular practices. Urbinati el al. (2017) argues that exogenous factors do not seem to matter in the process of adoption or transformation.

However, based on one of the freshest research papers by Lüdeke-Freund et al. (2018) who identified a wide range of business model design options and proposed six major circular economy business model (CEBM) patterns (Fig. 20) to support the closing of the resource loops. These loops are based on repair and maintenance, reuse and redistribution, refurbishment and remanufacturing, recycling, cascading, repurposing, and organic feedstock business model patterns.

Industrial ecosystem supposed to function as an analogue of the biological ecosystem, which means circular economy and CEBM has the closest way of processing materials. For

businesses, the fundamental challenge of implementing CE principles is rethinking their supply chains and as a consequence of this the way of creating and delivering value through their business model should be thought through.

Slowing down the resource loops and eventually closing it, led to the concept of closed-loop supply chain (CLSCs) and to closed-loop supply chain management (CLSCM). CLSCM is a framework or tool what helps to achieve the maximum of value creation over the life cycle of a product with the help of dynamic recovery of value from different times and volumes over time. (Lüdeke-Freund et al., 2019)
There are six major reverse cycles: repair and maintenance, reuse and redistribution, refurbishment and remanufacturing, recycling, cascading and repurposing, extraction of biochemical feedstock.

To understand their six different patterns, they reintroduced the major cycle's model developed by EMF in 2012. It (Fig. 20) shows how CE looks like where resource losses and reintroduction of them happen on the loop and which steps a product goes through before they end up in a landfill.
According to their study, Lüdeke-Freund et al. (2019) says that CEBM can be considered as a subset of the broader group of sustainable business model. It is important to note that CEBMs are primarily located on the micro-level, on the level of the individuals and individual companies. Nevertheless, in some cases, it is discussed on the meso-level. The ultimate goal of CEBMs is creating value through reused resources and multiple cycles while reducing consumption and waste. (Lüdeke-Freund et al., 2019)
If a company aims to close its resource flows, it should reorganize its supply chain and redesign its business model, that would demand new competencies to create a competitive advantage with CEBMs. This would require a complex trade-off between social benefits, low-recycling rates, and higher rate of indirect recycling. Many established businesses do not appear ready to incorporate new ways of thinking and rethinking business model designs.

There are six major CEBM patterns (Fig. 21), each pattern has different combinations of design options and gives the core of the model and propose a generic business model pattern which is helpful for different businesses to decide which one of them should be taken into consideration and used to implement CEBM.
The supporting patterns can be originated from the major patterns, but they specify them more, to see where the business at and what could it aim for with business model and value chain innovation.

In the next subchapter, the study tries to explain the different sub-models established by Lüdeke-Freund et al. (2019). The shortened names are developed by this study, not by the original article.

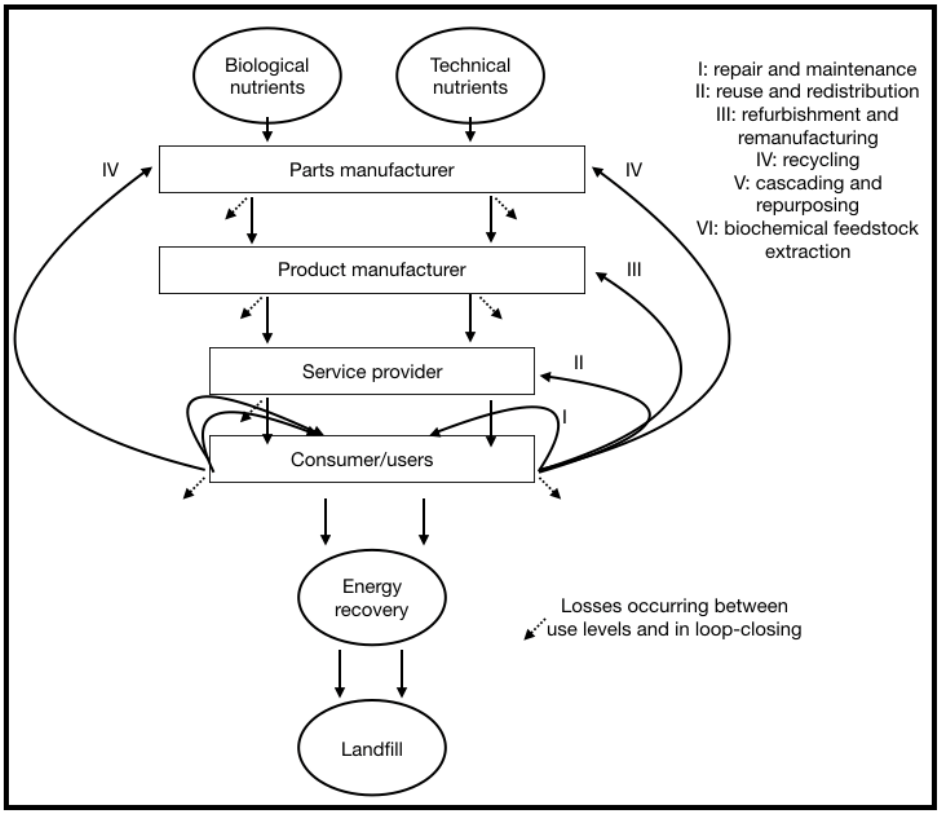


Figure 20.: Major reverse cycles for the circular economy (adapted from EMF 2012) - (Adapted from (Lüdeke-Freund et al., 2019))

MAJOR CEBM PATTERNS	REVIEWED CEMBs SUPPORTING THE PATTERNS
Repair and maintenance	Repair, product life extension, classic long-life method
Reuse and redistribution	Reuse / refurbish / maintain / redistribute / next-life sales; reuse; product life extension
Refurbishment and remanufacturing	Remanufacturing / next-life sales; upgrading; product life extension; extending product value
Recycling	Closed-loop production; rematerialization; recycling nd waste management
Cascading and repurposing	Multiple cash flows / multiple revenues; co-product generation from waste
Organic feedstock	Co-product generation from waste; circular supplies; resource recovery; industrial symbiosis

Figure 21.: Major CEBM patterns - (Adapted from (Lüdeke-Freund et al., 2019))

3.8.1 Repair and Maintenance Business Model – REMAIN

The model is based on life extension and on long-life design. Companies require having customer service, up-to-date technologies and knowledge, capacity for repairing, fast-learning and problem-solving skills. These services can be based on warranties and additional services. These companies are not about selling products; they are about selling superior products and creating value with the customers. Specific design and separating technical and biological cycles are highly important to be able to carry out the goals of this model. The main proposed value prolonged usability and functionality. The main question is the model is its sustainability in the economic sense. In the end, customers are going to pay for the product and the company should decide if they want to charge higher prices for superior products or not. The company can outsource the repair and maintenance, but a merged model would be the most profitable for each stakeholder.

3.8.2. Reuse and Redistribution Business Model – REURED

One of the sub-models of this model can be when the manufacturers simply offer these reuse and redistribution services, which is becoming more and more common in the clothing industry. However, these activities can be done on a customer-to-customer (C2C) basis. A hybrid approach is a combination of the two, above mentioned, models. The main value propositions for costumers lies in lower product prices and prolonged access to familiar products. It requires that the service provider take used products back, either directly or via another actor. Then the used products are directly resold in slightly enhanced form through cleaning and repairing small defects. Nevertheless, repairing and cleaning is not necessary a part of this sub-model. The expected effect is a substitution for new products and virgin materials for the manufacturer and these can save money for them.(Lüdeke-Freund et al., 2019)

3.8.3. Refurbishment and Remanufacturing Business Model – REFREM

This model requires a reverse logistics to obtain access to used products or components with fact that they are capable to improve the physical state of the product. These products can be donated or collected, so the customer does not have to care for the waste. Remanufacturing is more profound than refurbishing and it leads to a just as good as new product, if it is not even better. There are some cases, when third parties carry out the process of refurbishment or the process of remanufacturing. The adaptation in the business model a full life cycle perspective is needed, where the environmental assessment has already taken place. (Lüdeke-Freund et al., 2019)

3.8.4. Recycling Business Model – REC

It is built on re-materialization and closed-loop system, but other than the similar base, it can take various forms. According to some research papers, recycling could work at the molecular or even at the atomic level. This has been already experimented in different industries and in many countries the recycling business model is present, but highly diverse between countries, cities or even neighbourhood specific and involve different actors. However, it requires special skills and resources and deep understandings of different chemical and physical processes. The

assumed effects of this model can be reduced production costs and allowed product differentiation. (Lüdeke-Freund et al., 2019)

3.8.5. Cascading and Repurposing Business Models – CASREP CEBM

This business model is built on the idea of multiple cash flows/multiple revenues and co-product generation from waste. It describes the repetitive use of energy and material contents and leads to processes that are fed by external energy input. (Lüdeke-Freund et al., 2019)
In this business model, innovation and innovative technologies have a big role to create and deliver value. According to Lüdeke-Freund et al. (2019) this model is absent from the literature. The Ellen MacArthur Foundation finds it important to recognize the relevance of cascading for the CE, but it is not clear about the corresponding business models: who is proposing a particular value proposition and how the value is captured, and how different organizations' energy and material flows can be coordinated. (Lüdeke-Freund et al., 2019)
The business model can offer a variety of green inputs and products, it is characterized multiple and interlinked value propositions, it can lead to repurposing the related materials for different uses. The results can lead to extended relationship with different stakeholders due to the various value creation processes. (Lüdeke-Freund et al., 2019) There are two major subtypes of this business model in the future. One of them could be facilitation material flows regardless of the distance of material sources and users. The second one is supporting the local IS network.

3.8.6. Organic Feedstock Business Models –OFED

Processing organic residuals is important to have biomass which can be a way to close a loop and for example produce soil and re-introduce organic materials to the nature.(Lüdeke-Freund et al., 2019) Bioenergy and refinery business models are the most common types.

3.9 Design strategies for Circular Economy Business Models

It is need to be innovated parallel with supply chains, product and services, just as networks and stakeholder relationship. Design strategies can support to develop long-life products or product-life extension and can help the separation of the technical and biological materials contained in products.

These strategies contribute to facilitate retention to product vale. The strategies can include standardization, compatibility and provision for spare parts. (Lüdeke-Freund et al., 2019) In these strategies, resource loops should be slowed down, closed and narrowed for the implementation of CE. Slowing loops means extended life of products with slower resource usage. Closing the loops means recycling to close the loop between post use and production. Narrowing them means using fewer resources through for example lightweight design and efficient manufacturing process. This one also fits in the current linear economy, while the first two one typifies CE. Some of the CEBMs are looking for slowing resource loops by retaining product value; some of them seek the material value by closing the loops. Cascading and organic feedstock models focus on retaining the value of biological materials, whereas recycling models use postconsumer waste mainly from the technical sphere. Those businesses

that slow loops, they retain the highest possible value for as long as possible. Those that are closing the loops, retain value on the material level.

The relationships between CEBM patterns are showed in Table 17 (repair and maintenance, reuse and redistribution, refurbishment and manufacturing, etc.) and design strategies (design for long-life products, design for life extension, and design for biological cycles). The figure shows the different resource and value strategies assigned to different designs and patterns. The resource strategy could be slowing down the resource loop or closing the resource loop. There are two different types of value strategy. The first one is the retaining the product value and other potential value-retaining effect is retaining material value. Retaining material value is connected to a higher level of circularity, just as closing the loops with CEBM patterns of recycling, cascading and producing biomass.

To carry out the change, the managerial influence on stakeholders has a big role in formulating and establishing circular-oriented policies and objectives, just as training internal resources and creating awareness on the need of the product design practices among all the actors of the supply chain. For managers, it is important to oversee the changes and the process of the implementation, to be able to rethink and revise it. (Urbinati et al., 2017)

Design strategies/ CEBM patterns	**Repair and maintenance**	**Reuse and redistribution**	**Refurbishment and remanufacturing**	**Recycling**	**Cascading and repurposing**	**Organic feedstock**
Design for long-life products Attachment and trust Reliability and durability	x	x	x			
Design for product life extension Maintenace & repair; upgradability &adaptibility; standardisation & compatibility; dis- &reassembly	x	x	x	x		
Design for technical cycles Using technical nutrients				x		
Design for biological cycles Using biological nutrients				x	x	x
Resource strategy Potential effects on resource use	Slowing			Closing		
Value strategy Potential value-retaining effects	Retain product value			Retain material value		

Table 17.: Design strategies for CEBM - (Adapted from (Lüdeke-Freund et al., 2019))

There has been a two-stage model developed by Parida et al. (2019) for implementing circular change for large manufacturing companies. Even though it was developed for manufacturing companies, aquaculture can use the model to develop their own. The two-stage transformation

model's one finding was about ecosystem readiness assessment which provides a starting point for understanding the different mechanisms and with the help of the understanding these mechanism move toward to a circular economy paradigm. (Parida, Burström, Visnjic, & Wincent, 2019) Ecosystem readiness has three components (Tab. 18) external, business model and partner assessment. The external trend assessment means the analyzation of trends that may directly or indirectly affect the business potential of the ecosystem. The business model ecosystem assessment is taking stock of the current business model in terms of the dimensions of value creation, capture and delivery and making a commitment about the further steps needed toward CE. The last type of assessment is ecosystem partner assessment that means that different managers have a deep knowledge of their partners' roles and responsibilities. However, ecosystem readiness assessment is not enough, there is a need for ecosystem orchestration mechanisms (Tab. 18) that has three types of mechanisms: standardization mechanisms, nurturing mechanisms and negotiation mechanisms. Ecosystem readiness assessment is the precursor for the actual transformation, but analysing the ecosystem orchestration mechanism is important too.

The two-stage model (Fig. 22) from Parida et al. (2019) shows the steps of the transformation from the ecosystem readiness assessment to the financial, social and environmental benefits of the circular transformation.

The CE paradigm has the potential to bring out the positive economic, environmental and social benefits. Companies – in this case large manufacturing ones, but every company can follow this example – have to transform their business models and their strategies and entice other companies and different stakeholders to do that. (Parida et al., 2019)

First-order category	Second-order category	Overarching dimension	Overarching dimension	Second-order category	First-order category
Analysis of emerging markets and technological trends	External trend assessment	Ecosystem readiness assessment	Ecosystem orchestration mechanisms	Standardising mechanism	Promoting formulation and establishment of industrials standards
					Pursuing technological standards co-development with selective partners
Analysis of government regulations and policy changes					Seeking formal certification through broader adoption
Shift toward service dominant business models	Business model assessment			Nurturing mechanism	Bearing early investment to reduce uncertainty
					Supporting ecosystem actor routine and competences development
Ability to identify mutually beneficial relationship					Sharing core knowledge and intellectual property within industry
Openness to new partnerships and cooperation	Ecosystem partner assessment			Negotiating mechanism	Establishing give-and-take rules for ecosystem orchestration
					Reducing likelihood of conflicts through relational interdepences
Understanding of trade-offs with new ecosystems creation					Controlling inclusion of new partners based on risk and benefit analysis

Table 18.: Data coding – (Adapted from (Parida et al., 2019))

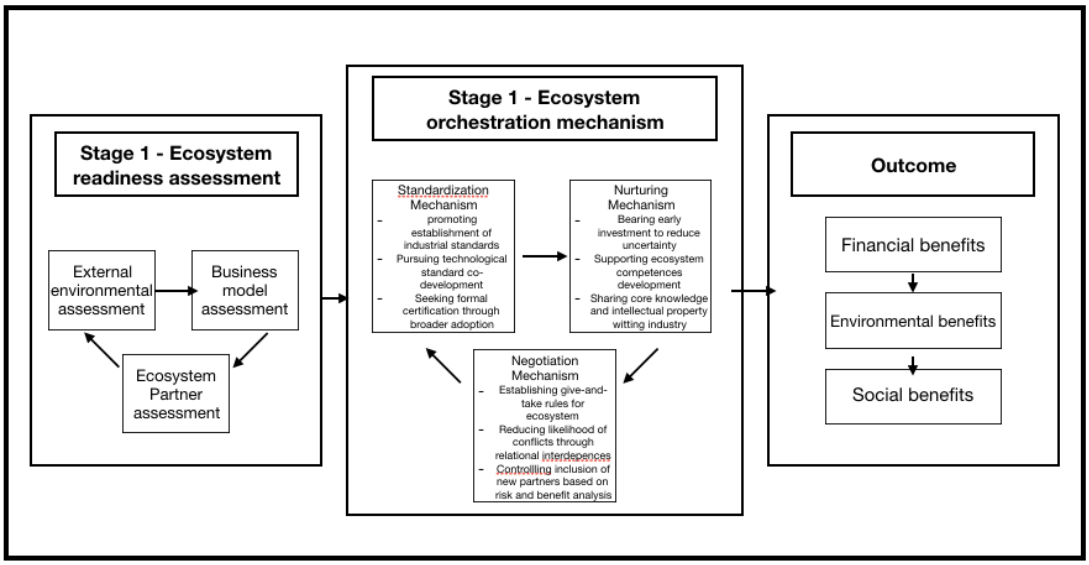


Figure 22.: Two-stage process model of ecosystem transformation to a circular economy – (Adapted from (Parida et al., 2019))

3.10 Value creation, proposition and delivery and capture in CEBM

Value proposition and its connection with the society is a neglected part of the research. This study tries to bring focus on the social side of the value proposition. Circular economy focuses on giving back to the environment, which is important, but without society, it is not possible. Research paper should put more focus on the society, because if there is no society that is willing to change, there will not be any change on the long run. The value proposition does not mean only focusing on the customer what the traditional business model does. The customer does not equal with the society. (Osterwalder & Pigneur, 2010)
Existing tools are failing to analyse the situation holistically that incorporates all the three dimensions of sustainability.

The expectations of CEBM when it comes to value creation include cost savings, reduced negative ecological and social impacts through reduced consumption of virgin materials and changes in the behaviour of customers and users. (Lüdeke-Freund et al., 2019) To understand the connection between CEBM and value proposition, the study uses the help of the article from Lüdeke-Freund et al. (2019) (Tab. 19) A transformation entails significant changes in the individual company and its ecosystem partner business models.

In the REURED CEBM the value creation potential are comparable to the repair and maintenance model. (Lüdeke-Freund et al., 2019) In this case, the use of virgin material can be debated; many goods are becoming cheaper which increases the consumers' real income.

The value creation potential of REFREM CEBM is based on the access to components and goods that can be enhanced and resold which leads to an improved reputation of the manufacturer.

BM Dimensions		CEBM design options derived from reviewing 26 CEBMs (the number of CEBMs that mention the respective design option is indicated in parentheses) *"CEBMs can be assigned to multiple options per business model dimensions; totals per dimension do not always add up to 26"*									
Value proposition	Products	Repaired, refurbished, remanufactured, or recycled products		Reusable or recyclable products	Products based on recycled waste		Long lasting products	Used products, components, materials, or waste as production inputs		Reusable or recyclable production inputs	
	Services	Facilitating collaboration	Take-back management	Customer education	Waste handling, processing	Product-/service based functions	Maintenance, repair and control	Product-/service-based results		Upgrading	Auxiliary services
Value delivery	Target customers	Quality conscious customer	Cost-conscious customer	Green customers	B2B customers	B2C suppliers		B2B suppliers		C2C suppliers	
	Value delivery processes	Connecting suppliers and customers	Providing access to a products's functionality	Providing (product-based) services and results)		Providing used products, components, materials or waste		Taking back used products, components, materials or waste		Sharing products, components, materials, or waste	
Value creation	Partners and stakeholder	Suppliers	Manufacturers		Retailers	Service providers	Public institutions	Collectors of products, components, materials, waste		Other (e.g.:researchers)	
	Value creation processes	Maintaining or repairing products, component	Refurbishing or remanufacturing products, components	Recycling of products, components, materials, waste	Upgrading or up cycling of products, components, materials,	Reselling products, components, waste	Taking back or recapturing products, components, materials,	Winning back base materials	Using used products, components, materials, waste as input	Matching over and under-capacities	Designing products, components, materials
Value capture	Revenues	Additional product revenues		Payments per unit of service			Payments for functions or results	Price premiums			
	Costs	Labor	Repair, maintence, control	Waste handling, processing	Manufacturing		Resource inputs	Transportation, logistics		Supply risks	

Table 19.: Morphological box of CEBM design options. – (Adapted from (Lüdeke-Freund et al., 2019))

The related value creation pattern to REC CEBM is based on down- and upcycling. Down-cycling converts used materials into materials of lower value, up-cycling works toward to higher-quality materials. The typical value proposition can have two faces, one is the green input or products (offered by waste collectors/processors or manufacturers using recycled inputs). This can be followed by lower input and product prices. Another value proposition is the uptake of products and materials disposed by customers and uptake the production residues in B2B relationships.

In CASREP CEBM the value proposition shifts to taking and winning back the biological nutrients contained in product components, used materials and waste. The value creation potentials of the model in terms of material and cost savings and societal benefits should be comparable to the recycling model. The effectiveness of the model might be even higher due to the possibility of tightening and adding further cascades. (Lüdeke-Freund et al., 2019) It is mostly associated with logical nutrient cycles, but they can be technical nutrient cycles.
In OFED CEBM the value lies in the green and organic-based inputs which can vary between chemicals and bio-based energy and fertilizer. The closing loop of biochemical feedstock can motivate a variety of CEBMs, with inputs from organic postconsumer or business partner waste that can be processed via different processes (extraction, composting, and digestion). The corresponding reverse flows can be organized and managed directly or indirectly as a value creation possibility. (Lüdeke-Freund et al., 2019)

However, customer preferences are not considered as a significant part of the CEBM, although the reflection on this side of the value delivery and creation process could differentiate between the business models and help to reach the companies' targets.
Roles of partnerships and different civil organizations are absent too from these researches, although it can be a complementary perspective in the field.

3.10.1 Aquaculture and value chain

Based on the conducted research in 2016 by FAO (2016) the aquaculture value chains between the different countries, farmed products, farming systems and environments. As a consequence of this, the number of people involved along the different value chains differs from place to place or from region to region. Different stakeholders play different roles and enter the value chain at different stages.

3.11 Systemic change

Systemic change means real change instead of hypothetical changes or changes of some parts of the supply chain. For example, green washing could be an example of bad practice when it comes to sustainability. (Baumgartner & Ebner, 2010)

3.11.1 Corporate Social Responsibility

According to Porter and Kramer (2006) Corporate Social Responsibility can be more than a cost, constraint or a charitable deed. It can be an opportunity for the firm, an innovation and a

competitive advantage. It should be seen as a great opportunity. (Porter & Kramer, 2006) Porter and Kramer (2006) introduced a framework what can be used by companies to identify all the effects they have on a society. (Tab.20.)

CSR is not new; customers' reactions are an important part of a companies' reputation and their competitive advantage on the market. There are four arguments what makes CSR's case: moral obligation, sustainability, license to operate and reputation.
However, successful businesses need a healthy society. To have that, education, health care, and equal opportunity are essential. (Porter & Kramer, 2006)
Additional to that safe product and working conditions, efficient utilization of resources, good governance and regulations, standards are needed to be able to expand, because any business which does not pay attention to the society where is it embedded, it cannot be successful on the long run. The society and corporations are mutually dependent of each other, which implies that decisions and policies must follow the same principles. (Porter & Kramer, 2006)
A company should create a social agenda, categorize and rank social issues; it moves towards to reinforce corporate strategy by advancing social conditions. It should be responsive and proactive.
Based on Porter and Kramer's study (2006) the steps should be (Tab.20): prioritizing social issues, from inside out mapping out the social impact of the value chain, and from outside in mapping the social influences on competitiveness and build a corporate involvement strategy.

Prioritizing Social Issues

Generic Social Issues	Value Chain Social Impacts	Social Dimensions of Competitive Context
Social issues that are not significantly affected by a company's operations nor materially affect its long-term competitiveness	Social issues that are significantly affected by a company's activities in the ordinary course of business	Social issues in the external environment that significantly affect the underlying drivers of a company's competitiveness in the locations where it operates

Corporate Involvement in Society: A Strategic Approach

Generic Social Issues	Value Chain Social Impacts	Social Dimensions of Competitive Context
Good citizenship	Mitigate harm from value chain acitivities	Strategic philanthropy that leverages capabilities to improve salient areas of competitive context
Responsive CSR	Transform value chain activities to benefit society while reinforcing strategy	**Strategic CSR**

Table 20.: Prioritizing social issues and involvement strategy for corporate actors. – (Adapted from (Porter & Kramer, 2006))

Managers can use the value chain to identify the social impacts in each location. Integrating business and social needs takes good intentions, strong leadership, reporting, network, incentives and adjustments in the organization. Managers can have the inside-out perspective and monitor the different activities (Fig.23). In this case, the value chain activities help to identify the positive and the negative impact on the different activities. In the same time, social activities influence the firm's competitiveness and have a big impact on its value chain activities. This is the outside-in perspective. It requires an understanding of the social dimension to improve the productivity firm and adaptivity of the firm. It is called the diamond framework

(Fig. 24) that shows how the conditions of the particular location of the firm affects to its competitiveness. (Porter & Kramer, 2006)

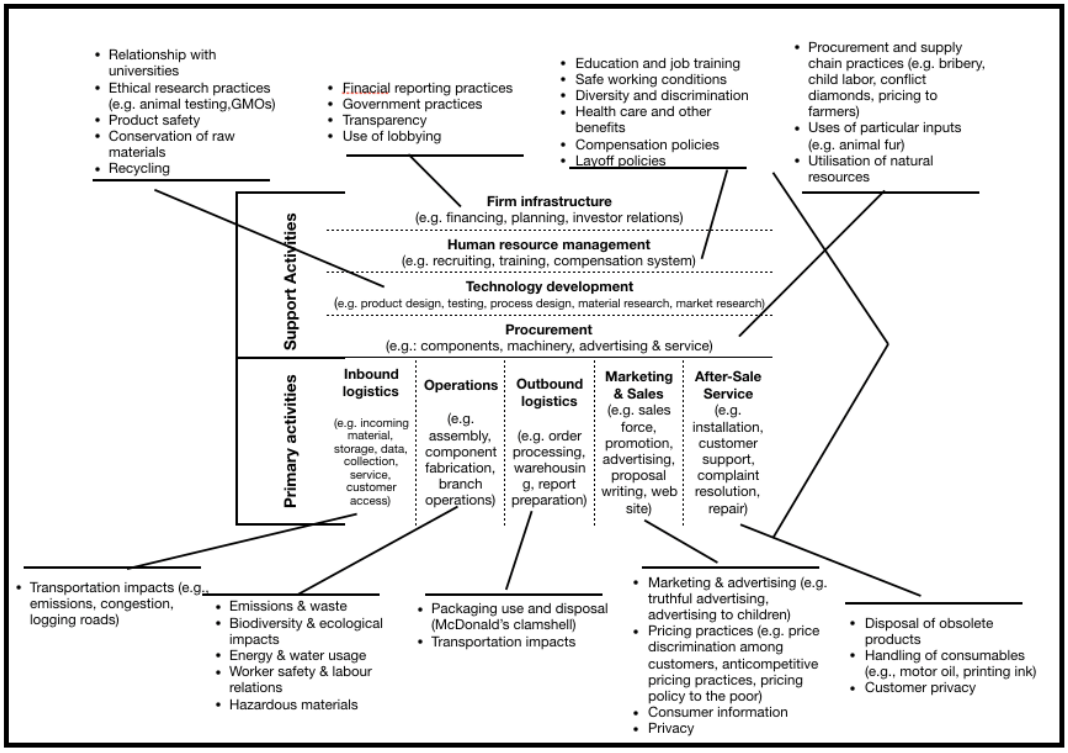


Figure 23.: Looking Inside Out: Mapping the Social Impact of the Value Chain - (Adapted from (Porter & Kramer, 2006))

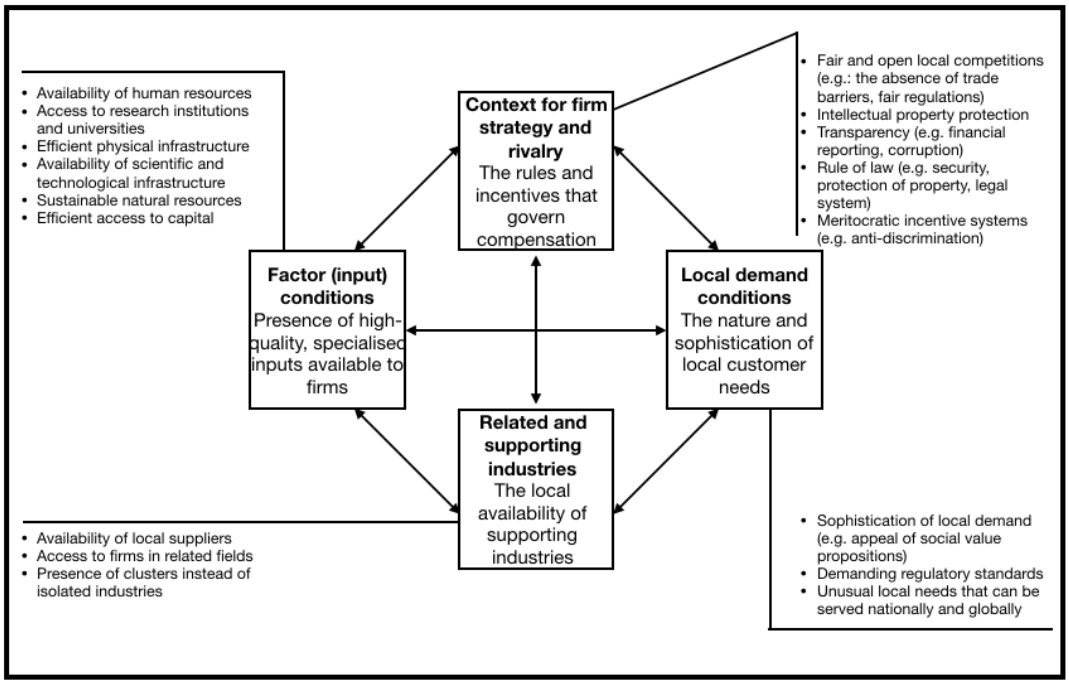


Figure 24.: The diamond framework - Looking Outside In: Social Influences on Competitiveness - (Adapted from (Porter & Kramer, 2006))

3.12 Consumer behaviour

Consumers and consumer behaviour have an important role in the economy. Consumer are the ones who are sustaining the different industries.
According to Sheth et al. (Sheth, Newman, & Gross, 1991) there are five values (Fig. 25) that are influencing the consumers' choices and these values can describe the consumer choice behaviour. The paper was published in 1991, but the influencing factors of consumer behaviour is still the same.

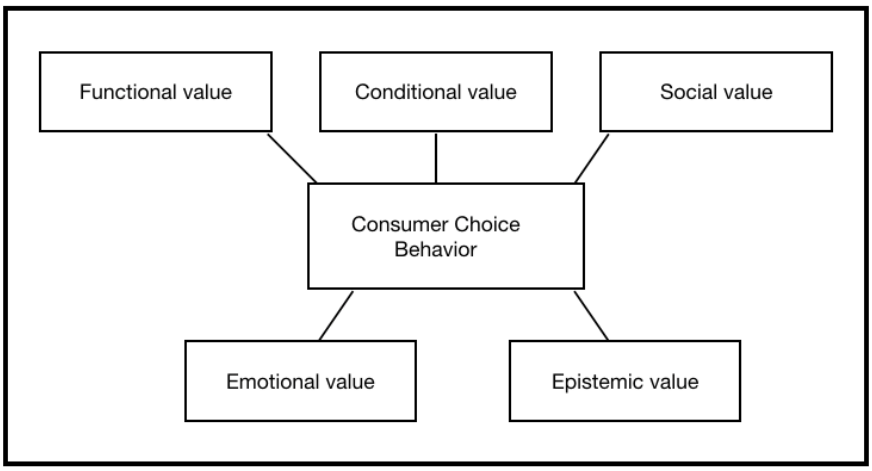


Figure 25.: The five values influencing consumer choice - (Adapted from (Sheth et al., 1991)

Each value is represented as an alternative that effects the final decision what a consumer has to make choosing a product.
Functional value describes traditionally the primary driver of consumer choice and it is measured on a profile of choice attributes.
Social value is defined by the acquired social associations, for example luxury products or heavily branded products (by trademarks or by social assumptions).
Emotional value defines the alternative when a product is associated with feelings and frequently comes with emotional responses, for example: a candlelight dinner or a romantic walk, it is often associated with products of aesthetic alternatives.
Epistemic value means the alternative that can be chosen based on previously collected knowledge or because of curiosity or novelty.
Conditional value is defined as an alternative that measured on a profile of choice contingencies and the utility often depends on the current situation.
However, not all the values are present at every purchase and every consumer has different values connected to the same or to similar purchases. Consumers are willing to accept one or more values missing if their cumulated gain is still higher than without the product or purchasing a different product. The study proposes (Sheth, 1973) that consumer choice depends on various factors and it can change with time, with knowledge and external influences.

When it comes to industrial buyer behaviour the situation is different, however the integrative buyer behaviour model can be applied as well. The background of the individuals, its

information sources, active search, perceptual distortion and satisfaction with past purchases influences the integrative model of buyer behaviour. However, there are cases when the previously listed factors are not relevant, because the decision is delegated to one party, which is not necessary, an agent.
There are six different factors determining whether the decision will be joint or autonomous (Sheth et al., 1991).
These factors are: product specific factors – the first variable is the perceived risk in buying decision: greater the uncertainty in the buying situation, greater the perceived risk so more likely that the purchase is going to be decided by all parties concerned.
The second variables are the types of the purchase, if it is a first in the lifetime then one would assume a joint decision, if it is a repetitive act then it is more likely to be made as an autonomous decision.
The third variables is the time pressure, if the decision has to be made in a short period, and then it is more likely to be an individual decision. The second factor is the company-specific factors with three variables: company orientation, company size and degree of centralization.

The company orientation is defined by the domination of job-specific people and the strength of their influence. If the decision is at a large company, then it is more likely to be a joint decision and if the company is centralized the less likely that the decision is going to be a joint decision. To sum up, the buying decision differs company by company, based on the domination of a field, the educational background and partly based on the company policy of reward for specialized skills and viewpoints.

During the past few decades, consumers became aware of the environmental impacts of different products and some seek to purchase environmentally friendly one for the benefits of the future generations. Companies used this market gap and started to sell the so-called green products. (Paul, Modi, & Patel, 2016) Green value creation is becoming important in consumer choices. Based on the study of Lin and Huang (Lin & Huang, 2012) people are willing to pay more for green products, so the price is not an influencing factor, just as quality and social value. Focusing on the different values what can influence a consumer decision are culture, behaviour and gender. (Sreen, Purbey, & Sadarangani, 2018) These green products generate profit and the company gain reputation through selling them. However, selling green products does not mean that these companies are truly environmentally friendly or green. In some cases, it can mean green washing to make themselves more popular among consumers. However, in the same time it brought more attention to environmentally friendly processes, business model, environmental regulation and growing stakeholder pressure that can bring real change as well. Green products are those products that do not pollute the environment or exploit natural resources and they can be recycled or conserved. (Paul et al., 2016)

According to Planing et al. (Planing, 2015) consumer behaviour has an important role in the shift toward Circular Economy and Circular Economy Business Models. The classical economic theory argues that consumers are capable of this change, because they are purely motivated by rational monetary considerations. The “homo oeconomicus” would be only convincible if they would have to pay the overall lifetime cost. Consumers are not always

rational or objective or utility maximizing, they base their decisions on more subjective thoughts and beliefs. Habits, routines, non-functional motives, subjective norms and perceived moral norms have a big influence on the decisions of consumers.

Habits and routines, using the same product repeatedly over a long period of time that leads to a form of passive resistance, because of the satisfaction of the current situation. Habits are the strongest predictors in human behaviour. Changing the behaviour requires a lot of energy from a consumer and in order to change it, one needs to understand that the behaviour is often led by unconscious motives, directly not observable ones.
Non-functional motives can be social or personal, enjoyment and entertainment. If the usefulness of the product does not generate amusement for the user, then it is going to have limited impact on them. A new business model is very time-consuming, that is why, and when one develops, one model has to take into consideration the invisible and unconscious motives of consumer behaviour.

Subjective norms represent the perceived social pressure, injunctive norms and descriptive norms. Injunctive norms represent the perceptions concerning what should be done, descriptive norms mean the perceptions that others are or are not performing the behaviour in question. They have a key role in transforming consumer behaviour towards a more circular economy and can be a catalyst for change if employed in the right way. However, the most important aspect for the Circular Economy is the moral obligation to perform a certain behaviour.
Perceived moral norms have a big influence on individual behaviour and decisions, they must come from the society itself. The regulation will not create moral obligation to do somehow. Influencing the whole society to do so is a long-term task and only can be achieved by cooperation and idea-flow within the society.

4 REMODELLED VALUE PROPOSITION DESIGN FOR CEBM

The value proposition canvas can be originated from the Business Model Canvas. The value proposition is part of a firm's business (Fig. 26) model.(Osterwalder, Pigneur, Bernarda, & Smith, 2014) The following chapter tries to explain the connection between value proposition and circular economy, while offering a new Value Proposition Canvas for CE.

According to the book of Osterwalder et al. (2014) the centre of value proposition is in applying tools and in multiple search phases. Value proposition design shows how to use the value proposition canvas and with the help of the canvas design, test and evaluate ideas. However, it is never-ending process, because the needs of consumers are changing parallel with the changing economy, technological innovation.
The environment map helps firms understand the context in which they operate. The business model canvas helps firms understand how to create value for their business. The value proposition canvas goes one-step further and steps into the framework of the business model canvas and helps firm understand how to create value for their customers. To be sure about having a great and strong business, the firm can evaluate its business model based on these seven points: what are the costs of switching, what about the recurring revenues, what is the balance between earning and spending, what is the game-changing cost-structure, how much the firm relies on customers and third parties, scalability, how much is the firm protected from competition.

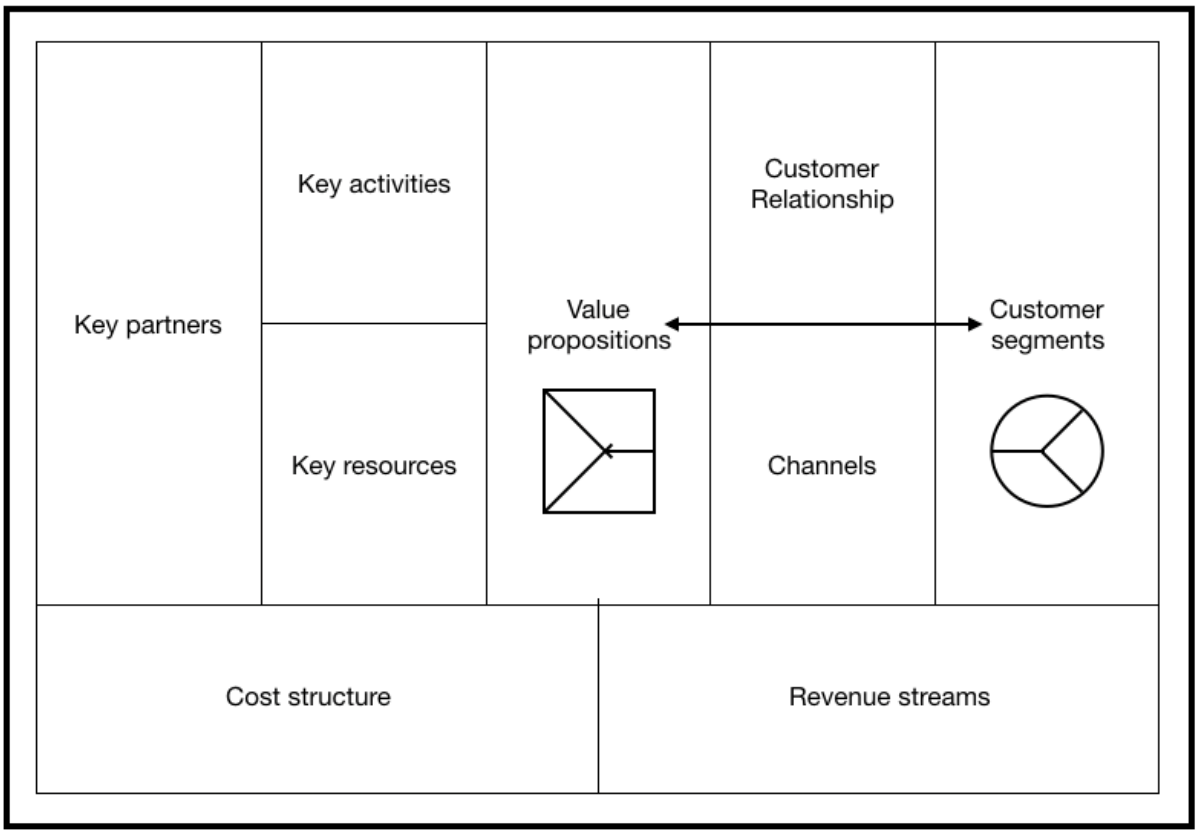


Figure 26.: Business Model Canvas highlighting the Value Proposition Design – (Adapted from (Osterwalder et al., 2014))

There are 10 characteristics of the great value proposition. First, they are embedded in great business models. They focus on the jobs, pains and gains that matter. It focuses on unsatisfied jobs, unresolved pain and unrealized gains. It goes beyond functional jobs and addresses emotional and social jobs. These models align how customers measure success. They focus on jobs, pains and gains that a lot of people have or that some will pay a lot money for. They can and they do differentiate between competition between different segments and what customers care about. The ninth characteristics is outperforming the competition at least at one dimension. The last one lies in the difficulty of copying it.

The value proposition (VP) segment cannot be understood without the customer segment. Value proposition is based on the products and services that create value for the customers. The customer segments explain who are the customers or organizations who should be targeted and to whom should be the value dedicated. The connection materializes through the channels and through customer relationships. (Fig.27)

First, the firm has to understand its customer profile based on every part of the customer segment. The segment is built up of customer jobs, customer pains and customer gains.
Customer jobs can be functional, social, personal/emotional or supporting jobs. Each type has different weight and importance in a customer's life and each is located in different context.
Customer pains can be undesired outcomes, problems and characteristics, obstacles and risks. The pain severity differs between extreme and moderate.
Customer gains show required gains, expected gains, desired gains and unexpected gains. The relevance level differs between essential and nice to have. Prioritizing each component can lead to a clear customer profile which is important the understand the firm's value map.

The different importance level applies for every segment of the value proposition. It is important to make each segment concrete during the value mapping process.
When it comes to customer profiles in B2B, transactions typically involve several stakeholders in the search, evaluation, purchase and use of a product or service. Organizations are customer that represents actors with different jobs, pains and gains. They could be influencers, recommenders, economic buyers, decision makers, end users and saboteurs.

The value map builds up from three segments. The firm has to clarify what kind of products and services they offer for the customer. They can be physical and tangible, intangible, digital and financial products and services and the relevance of these can be essential or nice to have.
Pain relievers describe how a specific product or service alleviate customer pains. Its relevance can move from nice to have to essential and back.
Gain creators outline how a firm intend to produce outcomes and benefits that a customer expects. Its relevance differentiates between essential and nice to have. The factors in different segments have to rank by order of importance as well.

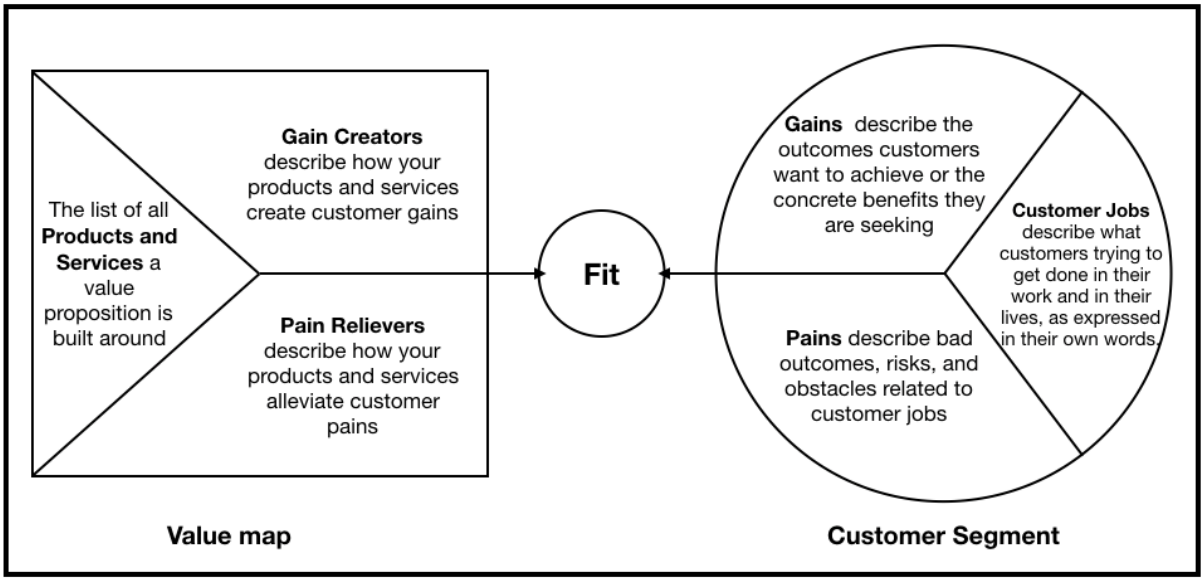


Figure 27.:Value Proposition Canvas – (Adapted from (Osterwalder et al., 2014))

The main challenges and opportunities are different when it comes to new ventures and to established businesses. With new ventures, the risks and challenges are lying in financing the change, but the opportunities are non-established structure, motivation and adaptability. Established organizations are facing with more challenges, such as getting a buy-in, restrained access to resources, cannibalization, rigid and slow process, career risks. The opportunities are lying in the established business structure that can be built on.

The fit between the two segments has been achieved if the customers get excited about the proposed value, but it is hard to please to a customer and none of the firms achieved to be satisfy every need of theirs. There are three kinds of fit.
The Problem - Solution fit there are no evidence if customers care about the jobs or the value proposition. It only works on paper.
The second type of fit is happening in the market. The Product-Market fit has evidence that the offered products and services are pain relievers and gain creators are creating value for the customers.
The third fit is the Business Model fit. It takes place when there is evidence for that value proposition can be embedded in a profitable and scalable business model.

There are two starting point of building a value proposition design. One is the technology push and the other one is the market pull. Technology push is a solution in search for a problem. It starts with an innovation or invention, building the proposition prototype, measuring the outcomes and learning from customer insights. Market pull is a problem in search for a solution. It starts with a problem in jobs, in gains or in pains, reaction to that is building a value proposition prototype, measuring the outcome, adjusting the technology needs and learning.
A firm has to identify the high-value jobs to create value. High value jobs are important, tangible, making the customer unsatisfied if the current VP will not resolve their pain and it is lucrative. So to innovate from Customer Profile has six ways to do it: addressing more jobs,

switch to more important jobs, go beyond functional jobs, help a lot more customers to get the job done, get the job done incrementally better and help a customer get a job done radically better.

Other than these, the firm can understand their customers better as a data detective, as a journalist, as an anthropologist, as an impersonator, as a co-creator and as a scientist.
After these steps, there are 10 questions should be asked to assess the value proposition canvas:
1) Is it embedded in a great business model?
2) Does it focus on the most important jobs, most extreme pains, and most essential gains?
3) Does it focus on unsatisfied jobs, unresolved pains, and unrealized gains?
4) Does it concentrate on only a few pain relievers and gain creators but does those extremely well?
5) Does it address functional, emotional, and social jobs all together?
6) Does it align with how customers measure success?
7) Does it focus on jobs, pains, or gains that a large number of customers have or for which a small number are willing to pay a lot of money?
8) Does it differentiate from competition in a meaningful way?
9) Does it outperform competition substantially on at least one dimension?
10) Is it difficult to copy?

Meanwhile of analysing the customers, the company has to look at its competitors and evaluate their value proposition model.
Based on this knowledge, the thesis tries to develop a value proposition design that is more fitting to the CEBM than the Osterwalder et al. (2014). In the following subchapter, the thesis tries to introduce the model systematically and locate in the CEBM and in the Earth's life support system.

4.1 Value Proposition Design in Circular Economy Business Models

As it can be seen in this chapter, creating value for the customer and for the business in the same time requires a balance. To create value for the customers in a sustainable way, the firm needs to create value for itself, but to do that, to create value for the business, it needs to create value for customer to keep the business going and keep it profitable. Without profit, a business cannot survive, but without additional value, a business cannot survive either.

In this subchapter, the study tries to develop a model for value proposition design in CEBM. For starters, it is important to analyse to acknowledge that not just the economy, but society is part of the Earth's life support system. Society is a neglected part of the research, but it is why it is needed to pay more attention to it. Consumers are part of the society; they influence each other's behaviour and willingness to pay for a product or for a service so offering a value and offering it in a sustainable way is important for a company if they are trying to survive.

Circular Economy is a bridge between the Earth's life support system and the economy. However, to be able to do that it has to cross the society. Griggs et al. (2013) developed the unified framework (Fig.28).

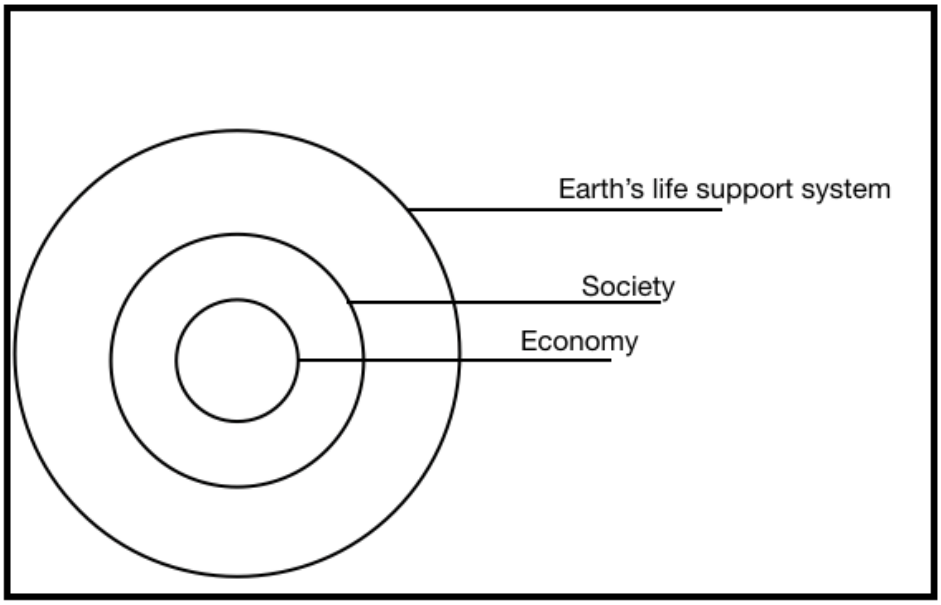


Figure 28.: Unified framework – (Adapted from (Griggs et al., 2013))

The framework shows where to locate the society and the economy in the environment and they are not separate entities, but they are in constant connection with each other. One reacts to another that brings a change in the third. The society cannot be taken out from the equation, especially because humanity is driving global environmental change. The global economy services society and both lies within the Earth's life support system, the connection is undeniable. (Griggs et al., 2013)
The term of Anthropocene is significant when it comes to society and human activities. The term refers to the period which is following Holocene and when human activities thought to have a significant impact on the environment. It has begun with the spread of the agriculture and then with the industrialization became stronger. CEBM and the value proposition should be understood and developed in the understanding of the Earth's life support system in the Anthropocene.

According to the new definition of sustainable development in the Anthropocene is a development that meets the needs of the present while safeguarding Earth's life-support system. Human pressure risks abrupt and possibly irreversible changes to basic Earth-system processes. In this perspective, the Business Model Canvas is part of the economy, but it has connection to the society and the environment as well. The connection with the society is presented by the Value Proposition Design and how a business proposes, creates and delivers or captures value.

To understand the model, the first step is locating it. The study locates (Fig. 29) the circular business model canvas. The circular business model is located in the circle of economy, since

it is usually used by economy, but every segment has an impact on the different parts of the Earth's life support system. The different segments are connected to circles in different levels. Instead of the traditional value proposition model, the study tries to transform that model to a more fitting one for the circular economy. The value map is converted to a similar model to Bocken et al.'s (2015), the customer segment has been converted based on the new value map side, and the different segments are at different levels of the Earth's system.

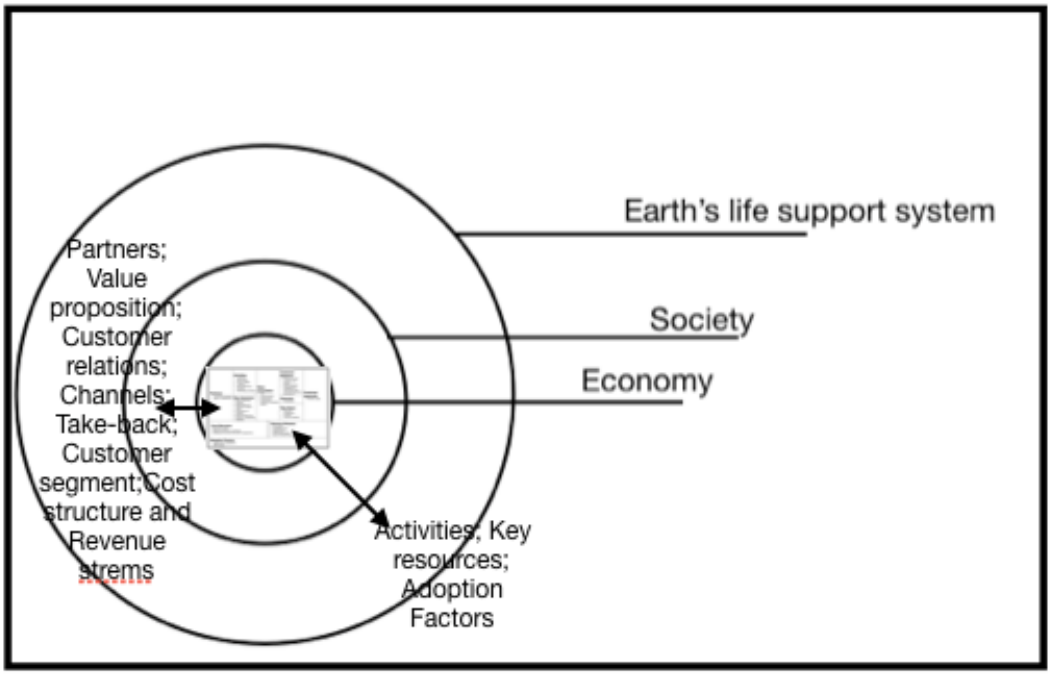


Figure 29.:CEBM canvas segments in the unified framework of the Earth's life support system – (Adapted from (Griggs et al., 2013; Lewandowski, 2016)

The Circular Economy Business Model Canvas (Fig. 30) has two additional segments, such as Take-back and Adoption factors, and this study tries to analyse the connection of the CEBM Canvas and the Value Proposition Design (VPD) and if it is necessary, change the VPD to fit into the CEBM. The thesis tries to look into how the new business model can contribute to offering more values and integrating realistically the society more into the business model and make it an active participant. CEBM supports practitioners to think beyond the individual business models and business systems. (Lewandowski, 2016) Thinking beyond can help to think in wider social perspectives of costs and benefits. There are six implementable circular economy perspective and these represent major circular business opportunities as well.
Based on the gained knowledge about the Circular Economy and its goals, society and creating value take up a huge part of the theory.

The core component of CEBM is the value proposition and the changed attitude towards it; it may concern a shift from a traditional from to a circular one. The value proposition is happening in customer relationships, revenue streams, key resources, key activities, key partnerships and cost structure, almost in every segment of the business model canvas. However, some additional

segments are needed to build up the circular economy business model canvas, such as take-back system and adoption factors.

In this understanding, the value proposition model that belongs to the traditional business model canvas should be rethought as well. The value proposition should be inserted into the circular business model canvas in the framework of the planetary boundaries and how the segments change in the value proposition design.

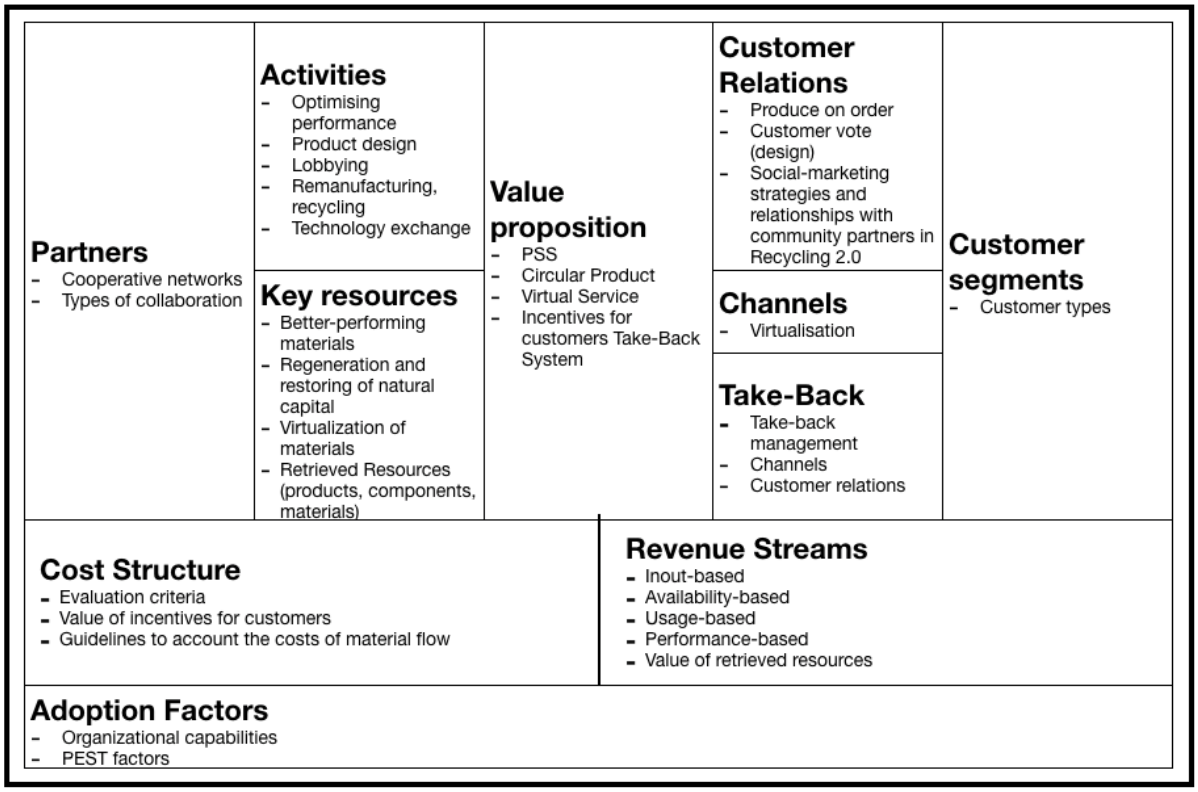


Figure 30.: A framework for circular economy business model canvas. – (Adapted from - (Adapted from (Osterwalder & Pigneur, 2010))

As it has been seen in this chapter, the value map and the customer segment creates a Fit.
Fit has been achieved when the customers gets excited about the value proposition. The customer reacts like this to the proposed value, when an important job had been addressed and it alleviates extreme pains and creates essential gains that customers care about. Striving for the fit, where pains have been relieved and gains have been gained, is essential for the customer and for the business. However, customer are not just receivers of the value but judges too. If customer react badly to a value, it can effect on the whole business model. Especially in the case of CEBM. In CEBM, everything is more connected than in the traditional Business Models.
While developing the new value proposition design model Lewandowski's (2016) paper had an impact too, who highlighted the structural and cultural attributes of CEBM. According to his paper (Lewandowski, 2016), the additional segments for CEBM canvas are needed to enhance designing more circular business models. The take-back system's core idea is that products and their components or materials can be cascaded and reused or redistributed, remanufactured or

refurbished or recycled. Reversing the logistics may require different partners, channels and customer relations and a new component can always change the flow.
The segment of adoption factors refers to those internal and external factors that are influencing the adaption of business model. Internal factors concern organizational capabilities and help to shift towards the circular economy business model. While external factors are about technological, political, sociocultural and economic issues. For example, the sociocultural issues are about customer habits, public opinion, and economic forces. (Lewandowski, 2016)

The thesis uses Bocken et al.'s (2015) value innovation opportunities figure as a framework for the Value Proposition Design in CEBM Canvas. The value innovation opportunities figure's core is the current value proposition of the company, which represents the benefits delivered to the stakeholders or different value exchanges taken place in the process. In this figure, the destroyed value can take various forms, but in this context, the most concerning is damaging the environment. These are often referred as negative externalities. Missed value opportunities represent situations where individual stakeholders fail to capitalise existing resources, capabilities or assets. These two segments can be possible due to the poorly designed value creation or capture systems. New value opportunities help to expand the business into new markets, introduce new products and offer enhanced benefits for the stakeholders. (N. Bocken, Rana, & Short, 2015)
The content of Bocken's model (2015) is not connected to a content of the new models. Therefore, gains do not mean destroyed value, pains do not mean missed value and opportunities do not mean products and services.

The framework of Bocken et al. (2015) value innovation opportunities can be used as the new value map (Fig. 31) and based on that to find the Fit between the customer segment and the value map.
The study used Bocken et al's (2015) value innovation figure to give a framework and Osterwalder and Pigneur's value proposition design to give content for the model. However, the customer segment in circular economy should be understood as the whole society, not just as a particular segment of it. Fig.32 is the part of the Earth's life support system and it is strongly connected to every part of the support system.

The value proposition design made by Osterwalder et al. (2014) has been already introduced in this chapter. It can be divided into three main parts. The value map with products and services, reflecting what the value position design is built around, gain creators that describe how the products and services create gains for the customers and pain relievers that describe how the products and services alleviate customer pains. The customer segment represents the customer jobs describing what customers trying to be done in their lives and in their work, gains describe the goals and the outcomes what the customers want to achieve or the concrete benefits they are seeking and pains describe risks, bad outcomes and obstacles related to the customer jobs. (Osterwalder et al., 2014)

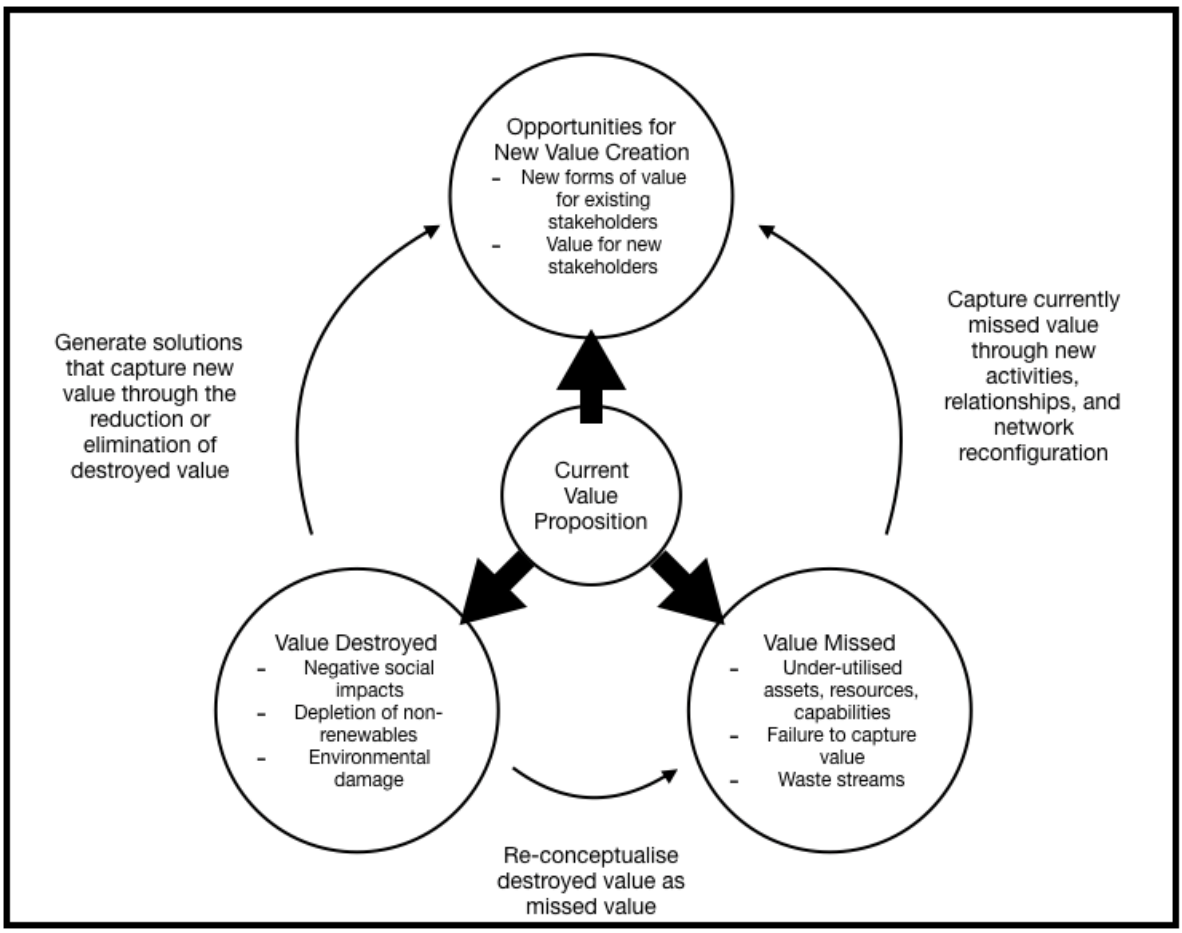


Figure 31.: Opportunities for value innovation – (Adapted from (N. Bocken et al., 2015))

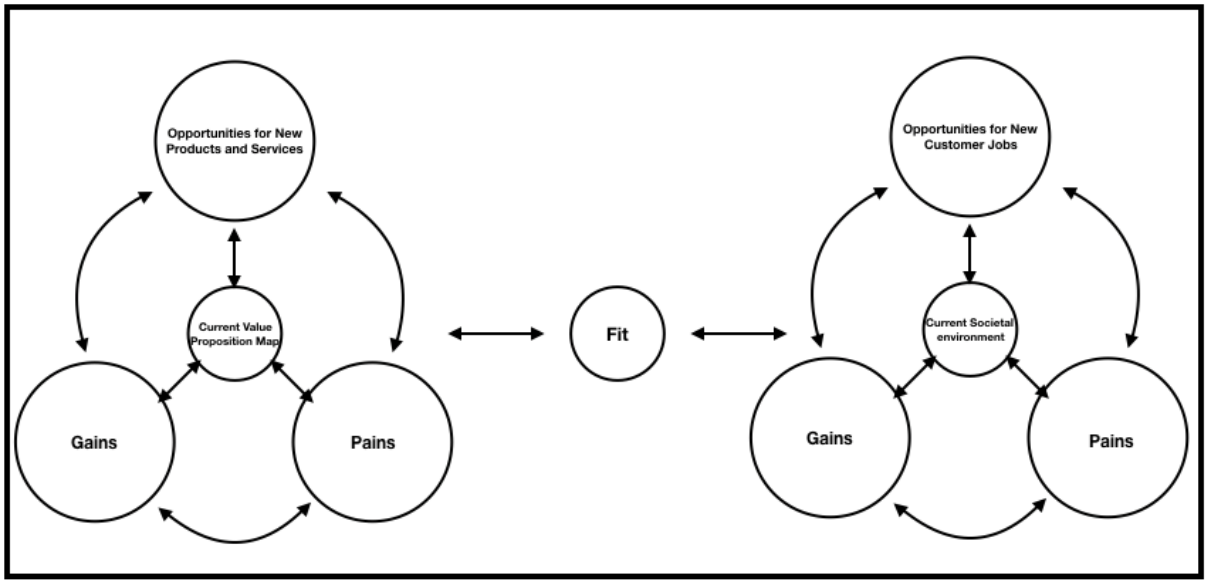


Figure 32.: Value Proposition in Circular Economy Business Model Canvas based on – (Adapted from (N. Bocken et al., 2015; Lewandowski, 2016; Osterwalder et al., 2014))

The model what the thesis developed is visualized in Fig. 32. It can be seen that there has been change in the framework given by the article of Bocken et al. (2015). The arrows between each segment are double sided, each end has an arrowhead. It supposed to show the interconnectedness between each segment and the constant change and development of the model.
Instead of using a given circle divided to three parcels, the new model tried to show the permanent and everlasting connection between the elements.
In the value map side, the current value proposition map is in the middle. It has a connection to the opportunities for new products and services. The current value proposition can bring a change in the current products and services thereby creating new products and services, but that change can come with additional pains and gains for the business. A new product or service can gain more customers for the firm, but it can come with spending, so with a financial pain. Reacting to this pain the company can change their product or their service and through it has and effect on the gains. However, the connection between pains and gains is existing too. For example, if a company gains more customers in a short time than they could handle, it can cause pains for example with that the company is not able to offer enough products or services for the increased number of consumers.
Because of the never-ending circle of change, the current value proposition map is changing constantly, which means that the current value proposition map is new every time when there is change in one segment.
This applies to the Fit as well from both directions.
The other side of the model, the customer segment part. In the middle, the current societal environment changes the pains and gains and jobs of the costumers. The current consumer trends influence the desired gains and the desired outcomes of the jobs. In circular economy, the goal of consumer jobs and gains is to reuse products and services as many times as it is possible and get this done for a lower price. For example, if there is an emotional job needs to be done, depending the outcome the consumer can gain with it or it can increase their pains. The situation in this segment is the same as in the situation in the value map segment. The current societal environment is changing with every change in the segments and it creates a fluid, always needs to be updated situation.
A change in one can bring a change in another one and it constantly changes the current value proposition map or the current societal environment and the consumer behaviour. Because of the constant changes in each segment, the circularity is assured and the constant reflection and improving, working for sustainability in a circular way is constantly happening.

4.2 Connection to Circular Economy Business Models and the re-modelled Value Proposition Design

It is important to shortly reflect on the connection between CEBM and the new value proposition model design.
The importance of developing a new value design model for the CEBM is questionable, because the two business models canvas are similar to each other. The study tries to bring in a perspective that has a stronger focus on the interconnectedness of each model, because interconnectedness and the constant reflection on different segments and how different actions

influence those segments are the core of CE and through that, this so-called flow is a significant part of CEBM too.
With a new business model, the focus of it can change and it can bring a shift of focus in value creation, proposition, delivery, and capture. This can mean that a new value proposition design is needed.

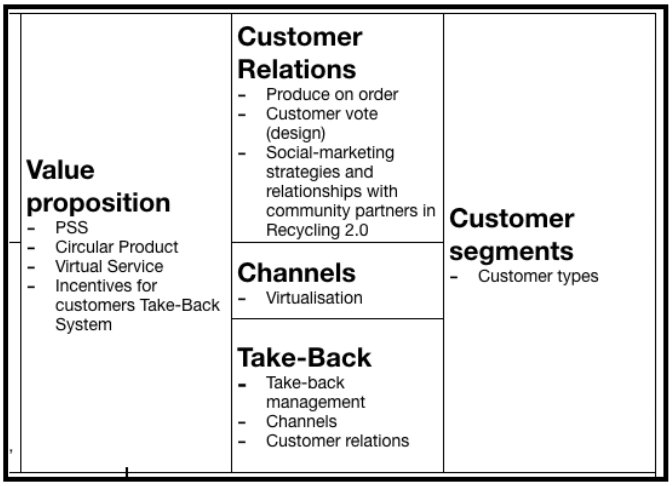


Figure 33.: Value Proposition Design in Circular Economy Business Models

From the new business model canvas, there is an additional segment in this part of the business model canvas. The channels of virtualisation and the take-back system as a new type of channel. However, this is not the only change in the business model canvas. There is a change in the value proposition segment with PSS, developing circular product, offering virtual services and incentives for customers Take-Back System. The customer relations changed according to the principles of CE, producing on order to eliminate over producing and with that generating waste, the customer's vote in design has a significant part in CE and additional to that, social marketing, introducing a particular product and its life cycle became a part of the canvas. Take-Back Management got its own segment, because it is one of the strongest principles. The customer segment has not changed, but with circular economy, new types of customers needed too, more conscious and proactive customer who value emotional jobs and additional services.

5 CASE STUDY

In the study, there have been two small-and medium sized business chosen from the aquaculture industry. Based on new studies(Commission, 2018; O'Shea et al., 2019), aquaculture and sea food can help to solve a lot of food-related problems in the future, but it has to sustainable to be accepted by consumers as well.

5.1 Norway Royal Salmon – NRS

According to their own research and website, even though only the 30% of the planet covered by land, 95% of the global food production happens there, meanwhile 70% planet is ocean and we only source 5% of our food from there, which even differs by different regions and geographical locations. (NRS, 2019)

The produced volume of fish was 31 900 tonnes in 2017, with 29 licences on the North and 6 licenses on the South with 200 employees. The trading volume was 77 800 tonnes fish to over 50 countries.

According to the informal meetings what we had with Norway Royal Salmon, salmon farming has an extremely low environmental impact.

The company gets the smolt from a supplier, but they have full control of the process from the smolt to the market place. They can monitor the fish during its whole history. They vaccinate them. They provide 1 million meals per day.

The fish is sustainable, the logistics and the operation is problematic.

The company wants to build a farm around Iceland that would their Artic Offshore Farm. They planned to build a Smolt Facility up north and bring most of their production there. They would have 88% of their production capacity at Finnmark and Tromsø. Additional to that they have applied for licenses for flip cage that is a multifunctional rotable cage, combining open and closed operations. The company tries to invest to sustainable growth with optimizing existing operations, building a new facility with lower production and shipping costs and with a new farm with new technologies. If they can keep the growth moderate, the good demand would balance their options. The main threat for the company are different diseases and infections, genetical pollution of wild salmon.

However, there is a need for a change in their language when it comes to wild salmon and farmed salmon. Their land-based production is not a success yet, because of biological issues. The escapees still exist, although the amount is small. Asia has the biggest carbon footprint because of the transportation. They are using cooling boxes when it comes to freezing the fish, these boxes are new technology, because they do not need ice inside of them, but the fish keep cold each other.

Time engagement is one of the strengths of the company. It takes 3-4 years from eggs to grow into salmon and they can monitor already 15-16 generations of salmon. They are all traceable and every one of them can be monitored. It is helpful and necessary because of their genetic composition, which ones are growing faster and which ones are managing sea lice better. Faster growth means shorter production time, which means more profit on the long run.

The feed is one of the bottlenecks of the industry. They know everything about it from the last 7 years, fish oil usage has been reduced, and the plan is the same with soybean usage. Algae could be the saviour of the industry.

The company's main focus is offshore farming, but now they are trying to develop freshwater solutions too, but it needs a lot of time and investments (time and money-wise)
The elaborated issues are: smolts and their way to the farms and escapees, building a smolt facility that can save transportation costs, fuel and water. It has sustainability and profit reasons too. The water recycling technology can lead to bigger freshwater plants. Nevertheless, the governmental policies are strict which can influence the marine industrial development.
Their values lie in their slogans:
"Committed by name" means that their corporate values are central to their business. The company tries to create safe and secure working place where everyone help each other. It is a solution oriented company while they always strive to be innovative and look for sustainable solutions. . (NRS, 2019)
"Committed to nature" means they started to write a sustainability report from this and they always tried to be aware of the sustainability issues and they try to have a big input in environmental issues. Fish welfare is among their high priorities, just as traceability and food safety. The value equals trying to develop and use environmentally friendly production. For example, preventing escapees, developing good fish and welfare, vaccinate and protect against sea lice, low medicament use (including antibiotics), sustainable and efficient use of feed and trying to come up with sustainable, if not circular, waste management. By 2020 all the company's production is going to be ASC certified. The company has a zero vision for the use of antibiotics. They believe in preventing instead of treatments. . (NRS, 2019)
"Committed to costumer" means that they produce healthy food, fatty acid and food safety is one of their number one priority. (NRS, 2019)
"Committed to people" means healthy environment and safety, correct and educated employees and taking care of the local community. Their farms are close to the local communities, but not too far, so they can employ these people and get connected to them, but they won't disturb their natural environment. Local support is important and crucial for them. . (NRS, 2019)
Nature, health and safety (HSE) are their highest priority, the company works systemically on their value chain and to develop their HSE culture.
In the following subchapter, the thesis tries to introduce the SWOT analysis of Norway Royal Salmon, based on the interview and on the independent research. With each company, the SWOT analysis was based on value creation, proposition and delivery. (NRS, 2019)

5.1.1 SWOT Analysis

Norway Royal Salmon is an expanding business. Based on the conducted research and interviews (Fig. 34) the company has its strengths in offering quality products and being honest about it and when it is needed taking the risk when telling the customers the change in quality. The company dedicates time to raise the salmon from smolt and makes every single fish traceable for the customer. The company has long-term customer relationships that are based on trust and delivering quality. Other than these factors, the clearly explained. The opportunities come from the strengths and the reaction to different problems. One of their biggest opportunity is building an Arctic Offshore farm with Aker Solutions and being pioneer in the market. Using the geographical opportunities wisely can help them to be a leader and gain advantage. Other

than these opportunities, working towards sustainable solutions is one of the most important actions what a company can do.

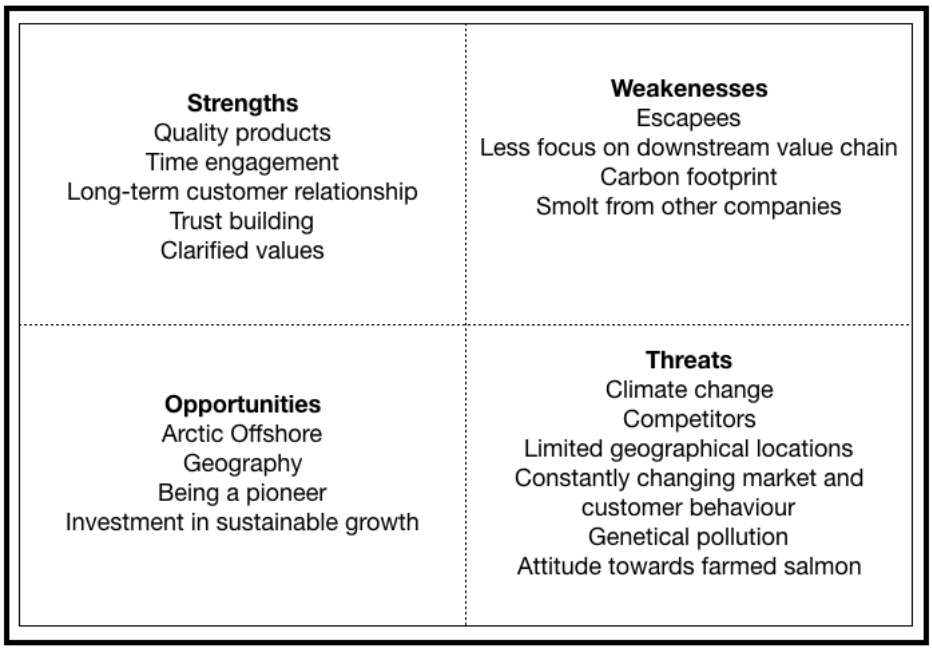


Figure 34.: Visualized SWOT analysis of NRS

However, just as many other companies, this one has its weaknesses as well. For example, the smolts are coming from different companies and they cannot prevent the escapes entirely. The industry's carbon footprint is high due to the transportation and the current changes in the company stops them to focus more on the downstream value chain.
The threats are connected to the environment and to the constantly changing market. The climate change effects on the temperature of the sea that means that the fish will not be protected against sea lice and different diseases naturally. This can risk the zero antibiotics vision of the company. The escapees cause genetical pollution in the wild salmon population and this effect on the customer behaviours and the already controversial reputation of farmed salmon among consumers. The limited geographical locations of possible farms and the limited amount of licence what comes with this can limit the possibilities and slow down the expansion of company.

5.1.2 NRS and value proposition

The second interview with NRS has been conducted through phone. The company does not have capacity to focus on the downstream value chain yet, because of the current changes.

In value proposition analysis, the pains and gains of the business and the customer and the products and services and the customer jobs should be analysed. (Fig. 35)
The Products and Services in the case of NRS are offering high quality offshore-farmed salmon. This is their core product and the whole value chain is organized around that. These products are tangible, only external factors such as sea lice or climate change can influence the product's

quality. The product is essential for value proposition, without it, there is no company to analyse or run.

In the terms of pains and gains, the company produces healthy and traceable product and it has ASC certification and Global Gap certificate.
All the customers can ask for each salmon's "CV" to know where it comes from, what did they fed them and how did they grow up. However, some of the customers have their own standards so they can ask for audit of the company, for example the biggest customer does it once per every year.
The company tries to focus on the overall value chain, because of the current changes in the company, for example building a smolt facility on the north takes up a lot of money, so focusing on the downstream value chain is not affordable right now but in the future the company wants to do that with the combination of branding and a good story, right now they offer healthy and tasty food due the production of the salmon and its quality. Right now, they work directly on the market and the logistics parts of the value chain and they only can offer products what they always had, but this does not mean that they are not trying to develop new products and improve the value chain constantly.

Due to technological change and the growing carbon footprint selling fish is going to change in the future. The companies have to find ways to offer food with low carbon footprint even on the other side of the world, for this, new technical equipment should be developed.

Understanding the customer is a big part of the value proposition, because without that a company would not know to whom do they create, propose and deliver the value and how the value capture happens. The company tries to monitor what different stakeholders and customers need in different markets, but not on the downstream part of value chain. If a customer is willing to pay more for their products, the company is happy, but the firm tries to focus on which types of customers do they have and if they have a good combination of the customers, and the continuing customer get what they got before and it satisfied their needs.

The main focus on producing high quality salmon while utilizing their capacity. Currently, the firm has higher number of customers compared to the other fish farmers, but on average it is smaller due to that they reach to a higher price but they have higher sales costs and the number of sales per customers is higher.

The firm differentiates itself from other companies with the trust what has been built and earned during the years. The company informs their customer if the quality is not as good as usual, according to them, it is better to be honest with all its difficulties and have a long-term relationship. Their main advantage can be that their production is up north, so the fish is less exposed to different diseases.

With the original Value Map Design, NRS value map would like Fig. 34 based on the interviews and the independent research.

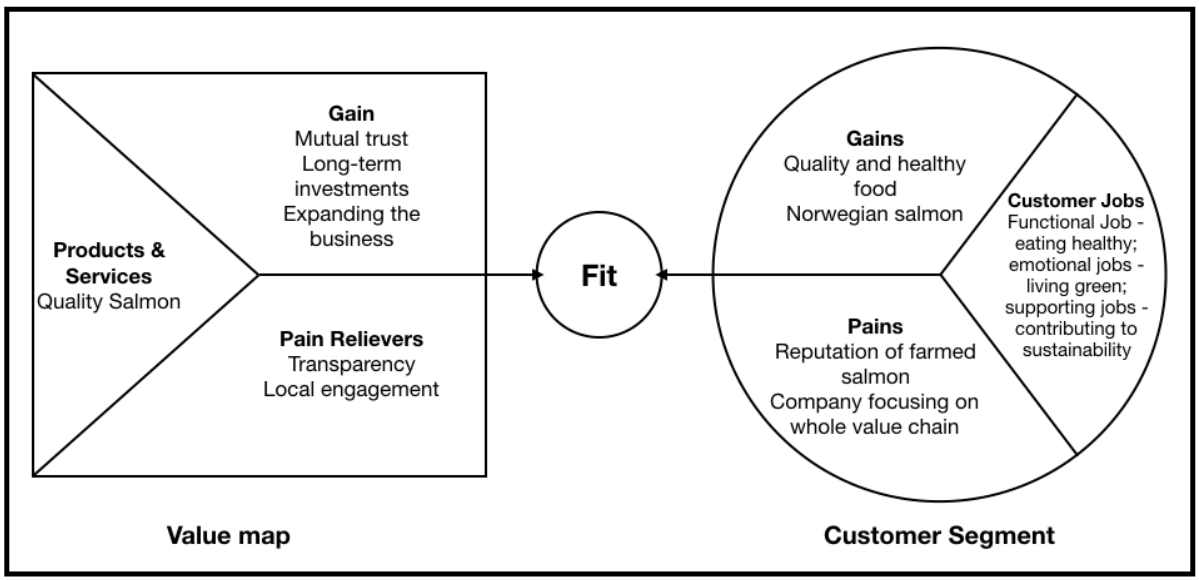


Figure 35.: Norway Royal Salmon – Value Proposition Design

5.2 Norwegian Fishfarming Technologies – NOFITECH

NOFITECH offers land-based salmon farming options with freshwater, but they try to develop offshore closed systems to prevent escapes and do not disturb the ecosystem. They offer cost effective solution that comes with educating the employees and the owners as well, when they purchase a product. However, they do not have sustainability report yet. (NOFITECH, 2019)
It tries to be eco-friendly and use recycled water and energy from water. The fish welfare is secured with deep-water solutions and UV filtered water. Because of the tailor-made solution, the construction takes short time and means less deviations, but similar, high quality cages that are safe against escapees. It is feasible, it has high capital costs and large scale intensive productions.
They are using recirculating aquaculture systems (RAS), which is more constant, it reduces water consumption and the total environmental impact compared to the production in traditional open net systems. The intensification and reduction of water usage would mean increasing risk of accumulation of potentially harmful substances including hormones and small particles.
When it comes to production, there is many conflicting interests. For example, limited space to build and have a land-based salmon farm. Education of farmers and follow up the changes. They recruit from the local communities; educate them, giving them advice how to be environmentally friendly.
They are trying to make add-ons: intake water, package (with supplies), reduction of energy use, possibility to treat their waste in a best way possible, brackish water, on-growing farms with special permit
Having a land-based solution is more challenging with seawater, but they are trying to work on that too. (USA and Faroe: keep them in fresh water) On land, one has to make a decision if they want to up bring the salmon in fresh water or on seawater, combining them is hard. Land-based solutions are easier. Easier to take care of them on land, but on land there is an on-going competition for space and the regulation can be challenging.

Sludge treatment could be a way to circular energy use, but fish farmers cannot take responsibility, that is why selling a package and offering easy solutions could be another step to make their system more sustainable. It can be a local and a rentable solution, easy to access. Training the people is important when it comes to using the facility and understanding different legislations, and this comes with a growing good reputation for the company.
They have a standardized module that means, it contains the hatchery and the post-smolt facility as well. The logistics of it are understandable for everyone. It is easy to operate, it is efficient, and they have the possibility to influence other companies or team up with them. They are not part of the ASC yet.
In the following subchapter, the thesis tries to introduce the SWOT analysis of Norwegian Fishfarming Technologies, based on the interview and on the independent research.

5.2.1 SWOT Analysis

Norwegian Fishfarming Technologies is a company that offers land-based solutions for fish farmers with their easy, tailor-made solutions. Most of their strengths and weaknesses can be originated from this. (Fig. 36) The strengths of the company are offering a quality product, the frame for land-based salmon farming, which is easy to use and there is no need for licence, so the overall costs of the products are lower. Because of the panel and the land-based solutions, there are no escapees and the RAS helps to be as sustainable as possible and the closed system helps eliminating sea lice.

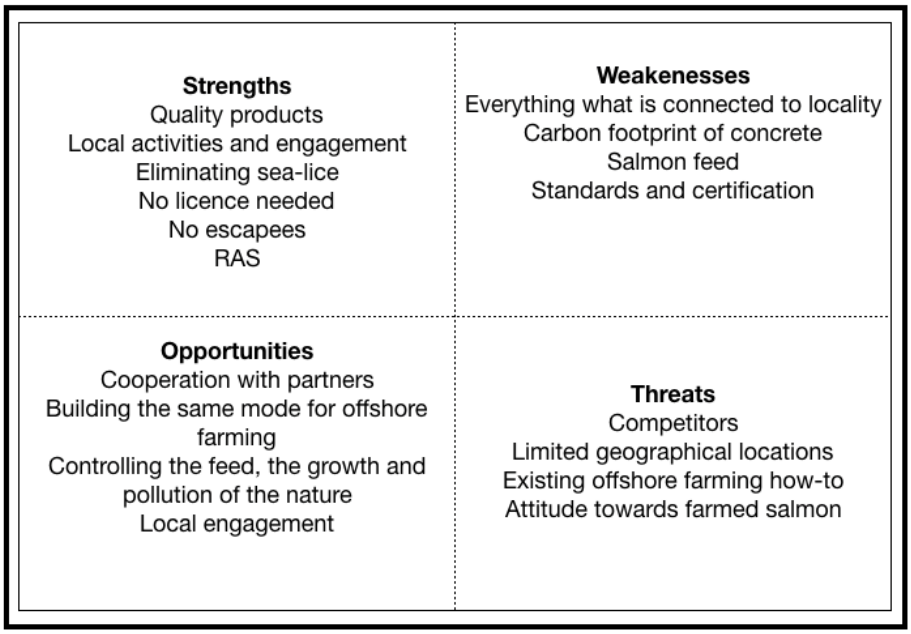


Figure 36.: Visualized SWOT analysis of NOFITECH

The opportunities when it comes to cooperation with the partners, the partnership and relationship is close and local because of the follow up education in different innovations related to the panels built by NOFITECH. There is a potential to use these tailor-made solutions in offshore farming as well, which could stop the fish from escaping and cause genetical pollution.

They can control the growth through the different feeding process and the pollution of the nature is limited too.
Weaknesses of NOFITECH lie in the connectedness to local operation. As soon as the module has been set up, the operation has to happen there. The carbon footprint of concrete (modules are made from that) is high, just as the unresolved issues connected to the feed. The company is not part of the ASC standards, which can be a problem on the long run.
Threats can lie in the competition on an international level and other companies offering land-based solutions for fish farming. It can be lower price or other promises. The limited options of locations is another threat for the company, because they have limited space and for that limited space, they have to fight legal battles with the local authorities as well. The existing how-to for offshore farming could be a threat for the company and for the customers' open-mindedness. The case of NOFITECH, the same problem as in the case of NRS, the reputation of farmed salmon can be a threat as well.

5.2.2 NOFITECH and value proposition

Based on the interview and the SWOT Analysis, the scientifically accepted version of the value proposition design would look like in the following figure (Fig. 36)
The company tries to focus on some parts of the value chains because of their limited human capital resources.

The company offers standardized modules for land-based salmon farming with recirculating aquaculture system (RAS).
According to the second interview if the customer has a pain, problem with the product, the company has a feedback system so they can react to the problem and solve it or at least work on it, especially if the problem is related to the management of the module, this can build a good relationship between the customer and the company and help to constantly innovate their product in a meaningful way. If there is a pain, they try to resolve it with the help of tha management of the module. It prioritizes between pains and gains, since they workforce is limited. The company tries to look at the whole system, but delivering what they promised is their first priority.
It addresses functional jobs first, a module that does the job. It is sustainable, easy to use, user friendly; it delivers high standard and quality. Good for the fish and their health.

The change and innovation depend both on technology push and market pull. It is the company's goal to be sustainable, and try to influence what is happening related to government and legislation and in the framework of those limitations.

The company, as every company, has to differentiate between jobs. The standardized system good for not just the costumer but for the company as well. It is easier to set the margins and earn money on a standardized product. High-value jobs are the jobs that mean improvement and even though they do not seem necessary in the short term, but they are good for the company and its commitment to sustainability and for the customers.

Understanding their customer works in multiple way, for example the company tries to hire people who already worked in the business, as part of the workforce. Other than this, the company tries to be present and talk to their customer through trainings, reaching out and personal relationships. The measure of the success is having customers like big companies and winning competition while they are sustainable. But the willingness to pay more is not in the products nature as with NRS.

Outperforming their competitors and differentiating themselves from them lies in compactness, footprint, price, automatization, follow-up and additional trainings, working on sustainable nutrients for the fish that can make the whole process easier, more sustainable and more transparent.

To sum up, delivering high quality land-based solutions for salmon farming, with the most innovative technologies where innovation can happen on a daily basis and having a feedback system with their customers to build a system that is built on trust and long-term relationship.
Based on the interviews and the research the thesis would offer this value proposition design (Fig. 36) in in the framework of the traditional business model canvas.

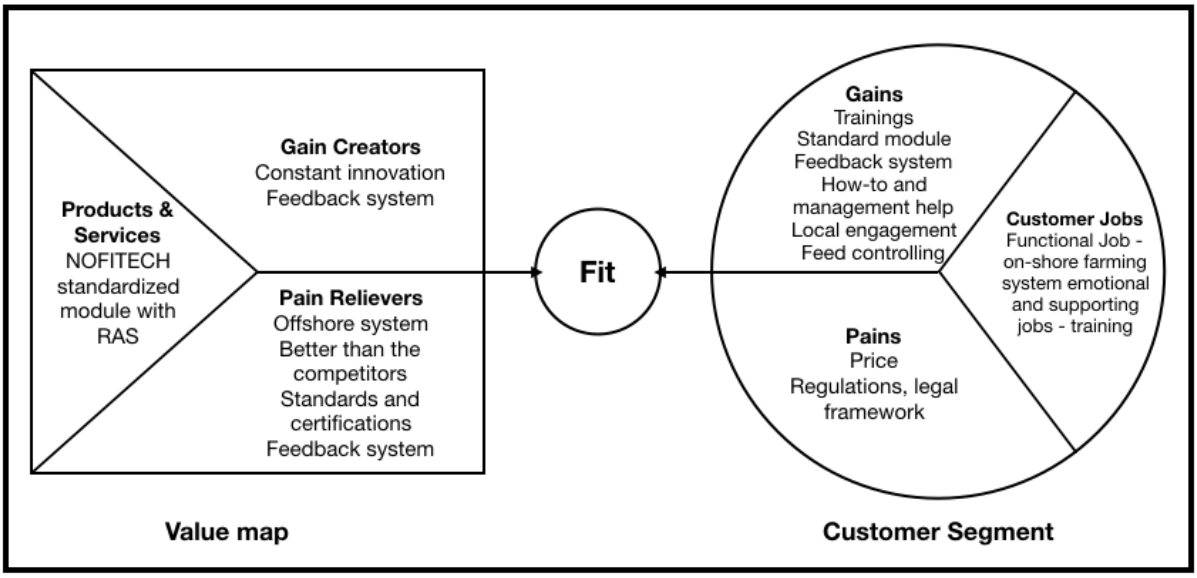


Figure 37.: NOFITECH - Value Proposition Design

5.5 Conclusion

To sum up, even though both companies represent different segments of aquaculture their goal to become more sustainable. However, to do that, the traditional business model is not enough. CEBM was developed based on companies that are producing goods, but many companies producing food and to produce sustainable food, the research should focus on developing solutions related to food and aquaculture.
Aquaculture and sea-food should have a bigger importance in our diet and to be a part of a sustainable diet, the research should help them focus on becoming more circular and sustainable while proposing value for the customer in a meaningful way.

6 ANALYSIS

In this chapter, the study tries to analyse each companies' value proposition and concluded if the new value proposition design works or not.

CE transitions needs innovation and socio-institutional change. The new model of the value proposition design tries to reflect the socio-institutional changes in the framework of Circular Economy. This can involve reviewing written and unwritten rules, customs and beliefs. There are three types of transitions and each involves technological innovation and socio-institutional changes. Socio-institutional changes constitute giving space for radically new technology in the society or technological changes that follow the social changes. The third type of transition where socio-institutional changes are central but facilitated by enabling technology, for example sharing economy, where ownership is not important anymore thanks to the technological changes and solutions during the years where everything became easily accessible. (Potting, Hekkert, Worrell, & Hanemaaijer, 2017)

Usually, there is no need to have radical changes in the regulatory framework to shift towards to CE, but it does need to have changes throughout the product chain. Not just costumers and users, but manufacturers and retailers will also need to take planned actions and steps toward the transition. CE transitions based on higher circularity need to come with a change throughout the whole production chain, but these strategies and changes are hard to measure. (Potting et al., 2017)

The same pains and gains, customer jobs and products and services can be inserted into the new map as well. However, the connections and the understanding of each segment changes because of the perspective.

Hypothetically, the model can only work if there is constant evaluation of it to work in a circular environment. The model can only work if the customer segment treats circular economy and or sharing economy as a gain instead of a burden or a ballast. Being able to participate in CE should be an easy add-on or and easily adaptable tool, what does not require a lot of extra energy from the consumer.

In the case of NRS: The consumer should look at the process as an emotional job instead of just as a functional or a supporting job. The consumer should find a specific emotional stage when they buy the product, it should bring peace of mind and additional to that it should satisfy the requirements of supporting jobs, such as being sustainable and traceable, and if it is necessary, the feedback of the customer should be valued. This has an effect on the gains of the customer, if the costumer is emotionally satisfied and content with the product then the gain is going to moderate the pain of the customer.

The customers' pains can be moderate or extreme based on how important is the job for them. There are obstacles, that a customer tries to stay away from or avoid and risks that should be avoided at any costs. Risks can be salmon that are not fresh; obstacles can be the reputation of farmed salmon and the higher price in different countries than Norway. NRS should calculate as the dissatisfaction with the products taste or quality compared to the expectations of the customers, this can be a problem or an undesired outcome.

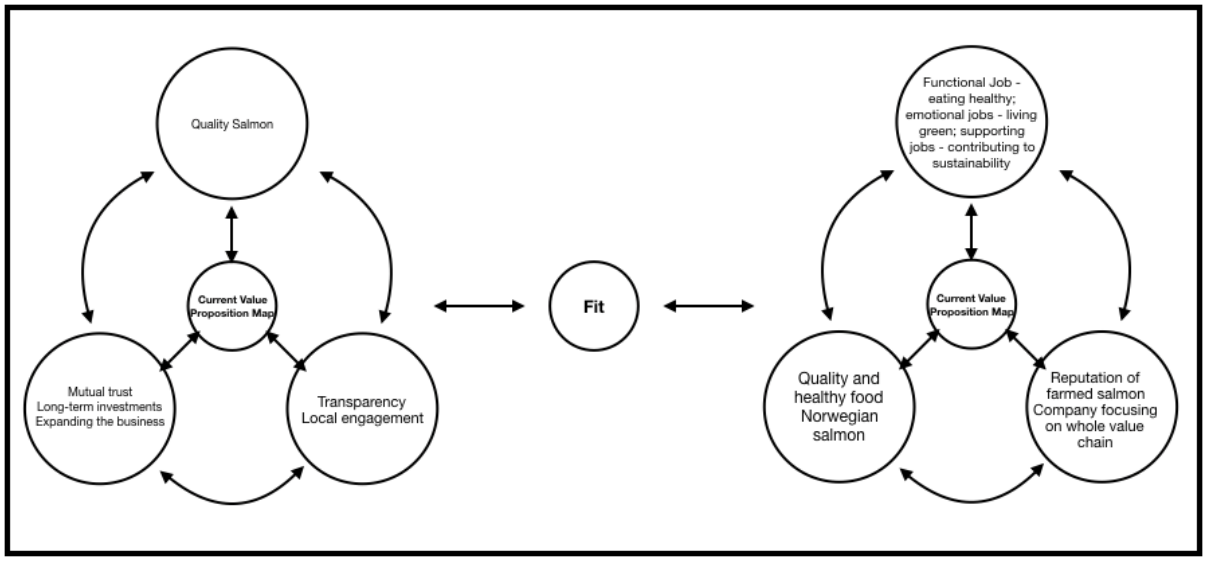


Figure 38.: Norway Royal Salmon Circular Economy Value Proposition Design

The gains of the customer can be required and expected, for example, that the produced salmon should be edible and healthy, and desired that it should come from sustainable sources; unexpected gains could be for example if the packaging is 100% biodegradable and the company offer additional services when purchasing the products. These can be for example donating money for ocean and beach cleaning or for research to develop sustainable feed for salmon after every purchase. The relevance can be nice to have or essential depending on the type of the gain.
However, if the jobs are not satisfying emotionally, for example, if the reputation of the farmed salmon is bad it can increase the pains of the customer and buying salmon is only going to be a functional job to eat healthy and for a lower price than wild salmon. Focusing on the overall value chain is a pain for the customer that can have the same effect for the customer jobs, buying the product of the company can be just a functional job, without any attachment or loyalty. This all breaks down to the previous and constantly reviewed old value chain, where the downstream value chain was not paid attention to.

The products and services in the value map side of NRS are set; NRS offers high-quality farmed fish, mainly salmon for markets outside of Norway. Their products are tangible, only affected by the climate and diseases. These two can make their product slightly intangible, in case of the temperature of the sea rises, which allows sea lice to infect the fish easier and this can lead to lower amount of product but for higher price, which leads to customer pains. To become more sustainable, NRS could develop more environmentally friendly feed (for example algaes) and offer environmentally friendly transportation. The company is working on freezing boxes, which make transportation easier, not ice, but the cold fish keep each other cold, and it makes them stay fresh longer. However, the carbon footprint of the industry causes customer pains in the era of being more circular, zero-waste and consuming local products and this can have an effect and cause pains, for example profit–loss for the company.

The company does not have to come up with pain relievers for every pain, but it can address the severe pains. Being transparent about every aspect of the company and the current quality of their product can set an example in the industry and gain more customer through addressing the controversial reputation of farmed salmon. Additional to that creating jobs and engaging in the life of the local community, increases customer loyalty through addressing social issues and increasing the local GDP. These are implicit gains for the customers that is why a company should engage in more gains that are explicit.

The gain creators can create a sustainably produced and harvested product, which is good for the environment and additionally its carbon footprint, the aim should be this. Right now, it is creating healthy food what comes from a trustworthy brand. The previous ones can be desired outcomes for the customers that help to build a good relationship between the customer and the company based on trust and loyalty.

To achieve the full fit, when all the customers are happy about the product and they are not having anything against the product, it hardly can be achieved, because customers are never entirely satisfied with a product.

Norwegian Fishfarming Technologies has a slightly different profile when it comes to value proposition (Fig.37), because of the offered products and services.

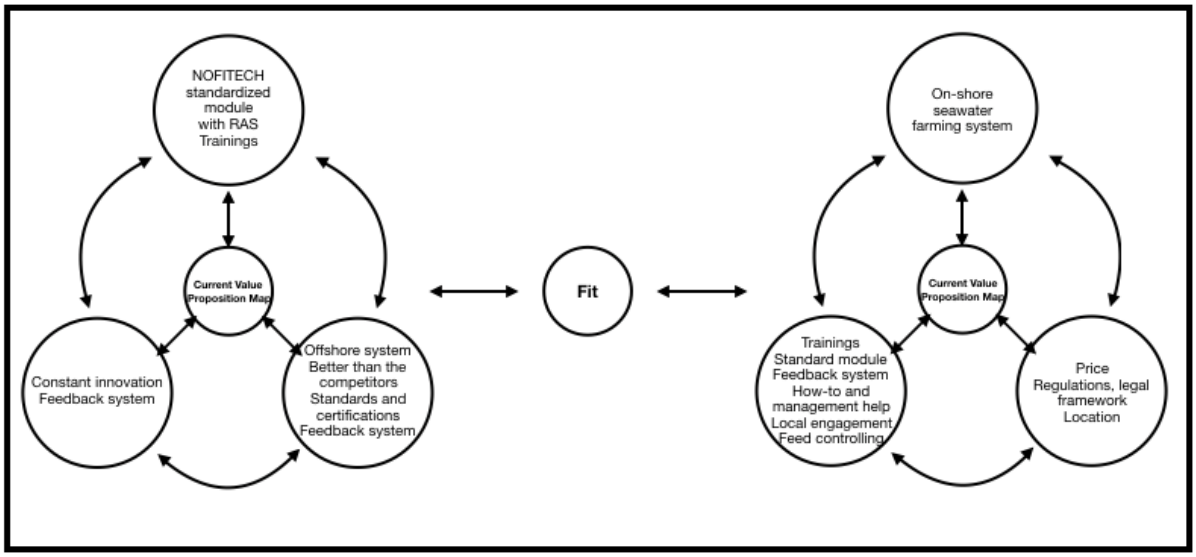


Figure 39.: Norwegian Fishfarming Technologies Circular Economy Value Proposition Design

In the sense of customer jobs, the customer has a functional job thanks to the offered product and the additional services. Their module satisfies the requirements and additional to that the company offers add-ons and develops sustainable feed for the fish. The land-based standardized farming system easy and sustainable that gives several gains to the customer.
However, the additional services can cause emotional engagement, because of the feedback system the customer can be attached to the product and feel safe if something goes wrong they

can turn to producer and ask for help. The company's aim to be sustainable is a supporting job, where the sustainability of the product and its durability is the co-creator of value.

The different types of jobs influence the customer pains and gains altogether. The pains of the customer can be undesired outcomes as the module does not work which is a functional pain or ancillary that can be connected to something in the management of the module, for example handling the sludge. The module can cause obstacles, for example without training the customers are most likely cannot use the product, it requires time-engagement. A possible risk with the module is if something goes wrong there is a risk, that the whole production can go wrong and there will be no fish to harvest in that module. Therefore, the standardized module has to work perfectly and the farmer should know every possible risk or step to fix it, that is why, trainings and the feedback system are necessary.
Since it is standardized, the price of the module is set, but it can be a customer gain, that the price is lower than with other models from other companies.
The regulations and the legal framework of setting up a module can be an obstacle or an undesired outcome if there is any solution for the problem. It can be related to the immovability of the module, if there is no place to set it up because of the regulations or because of lack of space, it causes high pains – risks – for the customer and for the company as well, because in that case if there is no place or permit to set the system up the company could lose profit.
The customer gains can come from many things. For example, the required gains are purchasing a product that works and they get a how-to to set the system. Their expected gains are based on the module that helps to produce healthy fish in a sustainable environment. Other than that, the feed controlling system can help to influence the growth of the fish. The customers' desired gains are setting up a profitable business.
However, additional to the basics that are coming with the module, the customer gets a package, a feedback system that can help to understand the problems and develops solutions and innovate the product constantly. In addition to that, the local engagement can bring unexpected gains in forms of jobs.

In the case of the value map, the products and services are clear in the case of NOFITECH. The company offer physical products and intangible services. The physical product is the NOFITECH module with RAS accompanied by the intangible services, such as follow-ups and trainings. A functioning module is essential and the add-ons are nice to have, but in the end, they are important as well.
The company tries to eliminate or outline pain in a meaningful way, through the feedback system, which can be a gain creator too. However, the company tries to get the different certificates and make their land-based system accessible on-shore. These could be significant pain relievers on the long run. Just as outperforming their competitors with the ongoing trainings and the level of the sustainability of the company.
The gain creators are the feedback system, constant innovation which can lead to a more sustainable business and more aware customers, who are not just want to gain profit but they want to do it in a meaningful and sustainable way. These creators give loyal customers for the company

For NOFITECH it is important to find sustainable solutions with great technical solutions, but in a user-friendly system. The company tries to go beyond of pains and gains and offer a package, something more than the competitors even though the competition is strong, but still in an understandable way. NOFITECH as a company can have many pains by itself, when it comes to regulations the lack of different certificates can be a problem on the long run, so to relieve the pain of the customer and the company, they should get the different certificates.

If the current value proposition map, in the case of NRS, does not focus on the downstream value chain, then understanding the single customer could change a lot in this case, because focusing on the small customers and their need can show the current socio-institutional changes in the society.
NOFITECH in their value proposition should have focus on their pain relievers and how to outrun those emerging pains of the costumer and of the company what can be solved with legal framework or being a pioneer in their field.
Being a pioneer is a risk for both companies, but they can gain more customers, engaged one, and through that, more profit.

Perhaps the new value proposition model is not necessary in the transition in CE, but it makes it easier to see the important interconnectedness between the old value proposition design and the new one and how the constant flow and connection is happening between the segments. A value proposition canvas should be made for each customer and products and services segment. Sometimes emotional and social jobs are more important for the customer than the visible, functional jobs and none of the companies should forget that while they are proposing value. The company should go beyond their products and services when they are offering value to be able to understand the real pains and gains of a customer. Most of the customers have a lot of pains and expect a lot of gains, based on that specifying pains and gains as much as it is possible. This allows examining how customers measure exactly success and failure. (Osterwalder et al., 2014) The products and services should be created to a specific segment of the customers, the reactions to pains and gains should be explicit during the value proposition but a company should not forget that pains and gains are not explicit; they are relative based on the customers' jobs, pains and gains.

No value proposition can address all the pains and gains and the Fit is going to be judged by the customers, if they refuse one, the company cannot do anything else, then offer a different fit through different pain relievers and gain creators if their products and services are set.
In the food industry, when it comes to customer jobs the supporting jobs as the transferrer of value cannot exist, because of health reason, but this does not mean that aquaculture should not aim for longer life cycle or reusing the generated waste.

In the next chapter, the study tries to elaborate on the model and its impact in the interconnected network of economy, society and ecosystem.

7 DISCUSSION

Circular Economy has an essential role in the future's economic development. Economic growth has a vital role in the modern society, for example poverty eradication, the pursuit for social justice, building social solidarity, defence of civic peace and establishment of good governance. The SDGs have a big role in economic development, some specified SDGs are for supporting economic development, but loosely each has a connection to economic development through human development and environment or the opposite way around. (UNEP, 2019)

With the growing population brings the question if there will be enough food, crops and water for the population and if we do not change our behaviour there will not be enough food supply to meet the global food demand. If supply wants to meet the demand, there should be change not just in our diet but also in technologies or processing food and producing food.

Aquaculture has a significant role in the process of sustaining the life on Earth. Seafood can sustain more life than it is sustaining now, so sustainable solutions in the aquaculture industry are necessary. Circular economy in aquaculture, reusing resources, using RAS and using sludge as biomass, while growing algae in the same time as fish in offshore farms are crucial. To have sustainable innovations and to be able to implement them, there is a need for existing socioeconomic conditions that are able to accept, understand and cooperate with these innovations. Climate change has on impact on the water cycle and the temperature and the level of the oceans.

Additional to these, it is important to address issues bigger than the company with the value proposition models. Equal rights, pays and opportunities should not exist just on paper, but in reality too and not just in the country of the headquarter but in those countries and at those companies where the local company has relationship and delivers to.

The connection between the environment and the economy is an important aspect too. Evaluating the economic dimensions of environmental impacts of economic activities is a key to build a sustainable business model and offer the needed values for customer and for the business itself. Environmental pollution is a major source of damage to the human health, health of the planet, equity and economic sustainability. Such as the disposal and discharge of waste influence negatively the ecosystem and the human health. Resource efficiency, and longer life cycles are crucial to achieve change, but to achieve the stage of circularity, developed countries should help developing ones to catch up and have a change in basic waste management challenges. Additional to that, the above-mentioned dietary changes are needed too. Producing and distributing nourishing and sustainable food is a necessity and a non-avoidable step in the fight against climate change.

To sum up, circular economy requires engagement in every level, on the level of businesses and on the level of the society. It starts with recovering energy and materials and the highest level is refusing making products that are not reusable. It starts with a socio-institutional change and it ends with the adaptation of the core technology.

In CE, the resources circulate through various processes, for example, they are being reused, repaired, redesigned or remanufactured and through these processes, the biggest aim of CE, waste minimizing and reduced need for raw materials can happen. Speeding up the transition involves a large shift in business and consumer thinking, just as demanding the adoption of sustainable production and consumption. The key elements of the CE are designing for the future, green taxation – market-based instruments, incorporate digital technology, collaboration, changed perspective on waste – using it as a resource, rethinking business models, preserving and extending existing products and prioritizing regenerative resources.
Rethinking business models is an important element for this study. It means that new business models utilize emerging technologies and share these developments and knowledge with other companies. (Managalagiu et al., 2019) To able to make a change in the business model, there are socio-institutional changes needed. Governments should introduce policies and regulations that help to address aspects of circular economy. First, hazardous waste should be eliminated from the lifecycle to be able to make the products' lifecycle longer and this should be written into the policies as well.
Governmental decisions are important in the transition, because they create an institutional framework for businesses that makes their institutional goals clear and understandable for them and for the consumers to what type of product should they look for.

Important that responsible consumption and production cannot be taken out from the equation, because circular economy involves people's changing consumption behaviour and choosing products based on which one can conserve more resources on the long run. Consumers should learn why and how sharing economy and reusing their products bring them gains on the long run and why is it necessary to think outside of the box and further than their generation.
To reach this, the company's presence and their local engagement are important. Educating their workers and through their consumers, because their employers are potential consumers too. Education and local engagement have an important role in each company's life and they count on that type of connection with consumer a lot. Additional to that, domestic consumption is important. It can be an indicator of the used materials and resources on a local level and the waste generated in each region. In aquaculture, it is important as well, because it can show the per capita consumption in seafood and how much waste is produced accompanied the production of salmon or building on-shore salmon farms. (Managalagiu et al., 2019)

The transformative potential exists; the businesses have to find and identify correctly the key advantage point in the system and apply the right and fitting policies and transformative changes. The social system when it comes to value proposition in circular economy should be understood in its complexity. It is difficult to see before a change or a new policy is implemented if it is going to work in the given society or not and what are the real long-term effects of the change.

In the terms of the value proposition, circular economy has a clear value chain. However, a company can shape their values network based on their products and needs and external and internal connections. The economic success is vital for a company to survive.

To understand how different business models talk about the value network, the first step should understand the social dimension of corporate sustainability strategies.
The social dimension of it can be internal and external. The internal means the way that corporate governance works, the motivation and incentives of a company, health and safety of the employees and the company's human capital development. The external aspects still can be connected to the value proposition of a firm. These are the ethical behaviour and human rights, operating without controversial activities, corruption and cartel and promoting corporate citizenship.

Value proposition is a significant part of the business model, because being profitable is not enough anymore to be successful on the market that is why systems thinking is crucial when it comes to business model innovation. Systems thinking can help avoid mistakes and controversial issues like green washing. The environment and humans are part of the ecosystem; everything what exists on the Earth is produced under the umbrella of the ecosystem. Hence, every company and business model should be considered as a part of it that means that no one of the actors or stakeholders can let themselves think that they are the biggest actors in this system.

In the sense of Circular Economy and Circular Economy Business Models, the value is proposed in way that using less resources and energy in order to achieve better performance and sustainable development and operation. In CE, waste is not seen as a low-value product. It is seen as a possibility to achieve change and reuse resources. It keeps materials in the circulation, which has a positive effect on costs and prices on the long run. The cradle-to-cradle production is about turning the linear model to a more sustainable one in order to generate bigger ecological, social and economic value. In this case, the value proposition can be seen in the changed network and partnership connections. For example, value can be captured in this case through collaborative consumption or sharing economy and in this case, the value can be proposed through retained ownership and lower costs and prices.
In CE, society benefits from environmental improvements and certain add-ons, for example fairer taxation or more manual labour. Based on Korhonen's research the social win of the CE can materialize through new employment opportunities through new uses of the value embedded in resources, increased sense of community, cooperation and participation through the sharing economy and different users sharing the product, the service and the function instead of owning it or consuming it.

The value is proposed through products and services, customer segments and relationship. Value proposition in CE is exceptionally important, because consumers and their changed behaviour gives the core of concept. Without conscious consumers and without their understanding. If consumer will not use the opportunities given by the circular economy and more exactly the sharing economy, then the core of the concept, meaning of reusing and reducing is going to be lost, what comes with the out-datedness of the concept or worse with the ignorance of the concept. Other than reusing and reducing, the social objects of the concept are increased employment, participative democratic decision-making and more efficient use of the existing physical material capacity.

However, the concept has social limitations, as it has been seen during the study, for example in different cultures the concept if waste comes with different understandings that means different handling, management and utilization. The concept of CE, just as every concept, is culturally and socially constructed so the meaning and understanding the concept of waste is constructed in a certain cultural, social and temporal context that is a dynamic, always changing concept. (Korhonen et al., 2018)

A business model contains and refers to the market, the value proposition, the value chain, cost and profit, the value network and the competitive strategy.
As a beginning, it is important to mention that creating value for a business and for the shareholders or for the consumers are not the same. (Chesbrough & Rosenbloom, 2002) In a business model, the value proposition is affected by the technical domain and by the economic domain.

Ritter and Lettl (2018) developed the business model, where they evaluated the different approaches in a value creation and the reasoning behind it and these five perspectives best to understand together to be able to map out and understand a business. Understanding the interconnectedness of the five perspectives means the understanding of the activities to reach the firm's goals, the logics behind the activity, the archetypes as the generic logics of the business, the elements of it and how all these elements fit together and support the goals of the business model and its activities.
Understanding the essence of the business and its value proposition is the easiest when the question asked is what it offers and whom does it offer it to. These two question can conclude the essence of the value proposition.
The most basic approach of a business model contains value creation, value position, delivery, and value capture, all from the perspective of a business. Ritter and Lettl (2018) imagined the business model as a membrane, where different elements have stronger and weaker linkages; they can be removed or inserted. They imagined the BM like this, because every business is different from each other so the same BM framework cannot be applied. However, the value chain is present is every business model and businesses.

Bocken et al (2014) developed a grouping system for sustainable business model archetypes. Three of the eight business model archetypes belong to the social group.
The first one is about delivering functionality, rather than ownership. It can be a part of Circular Economy as well; hence, it can be based on the sharing economy concept and retaining ownership. It shifts the business from offering manufactured goods to offering different combinations and services; the customer experience becomes more important than the product that can increase the customer loyalty. It shifts towards to a pure service model and it can reduce resource consumption in both sides (consumer and company). Motivates the manufacturer to deal with through-life and end-of-life issues so they can be the beneficiaries, not just the consumers because of the retained ownership. It can break the link between the profit and production volume, because of the retained ownership and the enhanced product durability. This archetype has the potential to change consumption patterns, but it requires the consumer engagement.

The value proposition can be materialized through providing services that will satisfy the needs of the users without having to own the physical products that can be the biggest challenge of the archetype because of the consumer behaviour and consumer society that is about owning the product. However, it can reduce the resource input and it can align better the manufacturers and the consumers' interests. It can be present maintenance of the product or extended warrantee, rental possibilities, shared ownership, pay per use, private finance initiative, or design-build-finance-operate or chemical management services.

The second archetype is 'adopting a stewardship role' which seeks to maximize the positive societal and environmental impact of the firm by ensuring the long-term health and wellbeing of stakeholders. The firm takes part in creating a thriving society and planet. In doing so, the firm manufactures and design products and services that are engaging with stakeholders to ensure the above-mentioned societal and environmental benefits. For example, through biodiversity protection, consumer care, ethical trade, choice editing by retailers radical transparency about environmental and societal impacts and resource stewardship. It can be reached through employee welfare and living wages, community development, sustainable growing and harvesting food and bio-diversity protection and regeneration.

The third archetypes under the social umbrella is about encouraging efficiency. In this archetype, firms are actively seeking solutions to reduce consumption and production. It aims to approach sustainability from the perspective of sustainable consumption. It should inform the appropriate use of advertising, sales and growth targets. It seeks product and service solutions that seek to reduce demand-side consumption and hence reduce production. The firm's focus is on innovation and influencing consumer behaviour. It can happen through consumer education, demand management, slow fashion, product longevity, premium branding and limited availability, frugal business and responsible product distribution and promotion.
The social value forms in creating sustainable value are equality and diversity, well-being, community development, secure livelihood, labour standards, health and safety.

7.1 Research questions

In the following sub-chapter, the study tries to answer the research question what have been asked in the beginning of the study. If it is necessary, it tries to elaborate on every aspect and if it necessary on why is it hard to answer to a particular research question.

7.1.1 What is the role of local companies to develop sustainable solutions with the help of the SDGs and contribute to circular economy?

From a value proposition perspective, local engagement of local companies is important. International, larger actors' engagement is important as well, but in the case of understanding their customer and understating their way of thinking, a local or national company has advantage.
Local companies can understand their customer on a deeper level, not just, because they have employees from the same local society, but because there are no language barriers or less language barrier and less cultural differences. In addition to that, these companies understand

how a society operates, what kind of processes keep the local community moving, what they lack and what do they need to become more sustainable.

A company that is familiar to the habits of the community can shift their focus and find a way to contribute to the local sustainability through their product, it can innovate in a way what is useful for the society, and it can easily adapt to the changes.
Building sustainable solutions on a local level can help to be able offer products with longer life cycle and offering these product and additional services (for example sludge treatment or more jobs) can help engage the customer in the issue of sustainability.

7.1.2 How does value proposition design changes in the understandings of the circular economy?

Circular economy is about complex principles where interconnectedness and the engagement of the different actors and stakeholder is important in the concept and in a working concept.
To understand the value proposition in CE, the study had to look into the changes of CEBM canvas and the BM canvas.
The segments related to the value proposition changed in CEBM. It is more focused reusing, recycling or taking back the products and through that extending the life cycle of the product. However, extending the life cycle and being able to reuse a product or some parts of it is not enough to become circular. Customer engagement, and changed consumer needs are necessary to have a change towards circularity.
In CE, the proposed value should be something more, something what the customer wants to change for or something what has an important additional value. Lately, because of the changing environment in consumer behaviour (for example the emerging trends of being zero waste, but most importantly focusing on sustainability) the companies have an advantage when they try to offer a sustainable product in the framework of circular economy.
However, the circularity is mainly for developed countries yet, to be able to truly become circular, companies have a significant role in the education of the importance of sustainability and circular thinking in developing countries. In addition to that, the role of local communities is significant to spread the principles of circularity and localize that. Spreading the principles of circularity could be the easiest the most understandable for customers if it is happening through value proposition design. Offering circular value and explaining why it is good for the local community is easier for the customer to understand the essence of the concept than coming up with a standard or a book of rules and regulations.
However, this research question requires more and longer research to be able understand the depth of question fully and calculate with every aspect of CE and VPD.

7.1.3 Why is it important to carry out changes in the value proposition design in circular economy business models?

The value proposition design should accommodate to the principles of CE.
From the study, it can be seen that the main principle of CE is offering products with longer life cycles and longer life cycles or reusing, remanufacturing the product, so the value is already in the principles, so if a product is made in a circular way than it already carries more value than the product itself.

7.1.4 How can Norway Royal Salmon and Norwegian Fishfarming Technologies change their value proposition and work toward circular economy?

Both companies should work on their sustainability and think further in the sense of circularity. NRS could develop transportation methods to lower their carbon footprint and contribute to the fight against climate change to conserve the temperature of the sea and to be able to grow fish there.

NOFITECH, other than getting the different certificates, has a big potential of the sludge treatment and offering additional services to get rid of it and using it ad biomass. In addition to that, developing innovations to use different materials than concrete, even though that is the most durable material if the company can offer something instead of that, it can make them pioneers on their field.

7.2 Evaluation of the new Value Proposition Design

The new value proposition model is maybe not needed in the sense of business model canvas, but a shift in how companies look at that side of the business model canvas is needed.

By the time when the company offers a product for their customer, they have already monitored the customer segment and understood the basic needs of the customers. If the product does not just offer the basic pain relievers, customer jobs or gains to the customer, but it does offer something more it can be an additional gain creator for the company. The principles of the CE start to manifest in producing a good, the principles are already in how a company makes a product.

There is no hard proof to know if it is necessary to have new value proposition design, because if a product or good or service is already manufactured, produced or offered in CE, then it already contains added value. CE's main principle lies in its added value, in having or offering something more in a meaningful way. Offer something what can be reused, reduced or reproduced after one customer used it and it can be a part of the ecosystem through different cycles (Lüdeke-Freund et al., 2019). However, value is an abstract thing and the value chain and their way of choice of delivering value is highly dependent on the company. VPD is a part of CEBM and the value is already a part of the original product, which means that the value can be a so-called plus in the framework of CE. In the terms of this, CE and CEBM are more evolved system if we measure the business models and economic systems in the terms of value creation, proposition and delivery and capture.

Therefore, one cannot know if the new model works or not, because the adaptation of it is highly dependent on the company and the local economy. In addition to that, value proposition something what should be accepted by the society, because they are the receivers of the value. Nevertheless, the society does not accept is or do not understand it is possible that is not going to work. CEBM already carries its value with the way of treating natural resources, the social and the natural environment.

Change in the society requires a whole new approach, measuring that is difficult because based on what should the study or the field measure the changes and compared to what, it is challenging in an economical sense too but it is more challenging in a social sense. If the field tries to measure the change in the adaptability of the society, it has to ask questions about the

society and consumer behaviour in the society, but sometimes even the best innovation does not work in a country even though that the preliminary research would show that it could work.

To sum up, if a society does not want to or because of different reasons cannot adapt an innovation or accommodate to a new system, for example circular economy, then there is no need for new value proposition design, so there is no society within this change can work.
The problem with the remodelled value proposition design is that to measure its possible success CE has to be implemented on a global level. CE and value proposition design cannot work on a regional level, because it does not fulfil one of the main principles of the concept, which that every stakeholder should participate in reusing, remanufacturing or cascading or the other steps of the CEBM should be implemented throughout the whole value chain.
However, to offer a great product the company has to get to know its customer first, so if the customer segment reacts good to a product and its circular as well, it is a win-win situation because company can gain profit, the customer can gain value as well, but the model can be only truly evaluated on a company level and only individually. Thus, the possibility of the implementation of the model depends on the receiving society and the implementing company.

The new model represents better the principles and the core of CE. CE makes companies more resilient to externalities, such as natural disasters, inflation or deflation and other risks. In conclusion, the value proposition design in CEBM is more timeless and resilient value than value in traditional business models.
The new model can be used to monitor each changes in the VPD and always be aware how that effect on the current value proposition does and how the customer segment reacts to that.

7.3 Reliability and validity

Scientific and peer-reviewed literature and self-conducted interviews had been used in this study and interpreted after best of knowledge. Because of the nature of the multidisciplinary approach and because of the lack of essential knowledge in many field can lead to inaccuracies in how the data was comprehended.
The theory part tried to overview every possible aspect of the study with many figures and tables and based on that the study tried to come up with the best solution and answers. Aquaculture is a constantly changing industry and many data came from older studies, circular economy is a developing field as well, but based on the current knowledge, the study tried to make the best evaluation and work on answering the research question.

The study is a so-called desktop, so many stakeholders were not part of the research, many it does not contain on-site evaluation either, and it did not establish direct contact with these stakeholders. To create explicit and literal results, the study would need more time. It is a recommendation or an idea to rethink the value proposition design in primary industries.

8 CONCLUSION

Aim of the research was to see if there is change needed in the value proposition design in Circular Economy Business Models and if yes, then the suggested model would be able to monitor the changes and different needs of the customer.
Circular economy creates different values, the value is already embedded in the products and services through the narrowed, slowed down, and closed resource loops. It means that maybe there is no need for a new value proposition design map, but the changed value creation, proposition and delivery and capture, just as the changed customer segment should be reflected on. For this reflection, the new business model canvas for circular economy is not fulfilling, because it does not show the embedded or hidden changes that have been realized while offering a new product or services produced or manufactured in CE.
In conclusion, the transition to circular economy is needed to save the resources, create more jobs and safeguard the Earth's system. In addition to that, it creates competitive advantage for the company and increases its local embeddedness.

Circular Economy is not just concept that can be implemented through governmental policies or international agreements, the concepts needs to have a change in the customer perspectives as well. The local community, just as much the global society has to recognize their role in the economy and in the Earth's system and how their behaviour and choices effect on it.
The economy hardly can push changes in the society, but the environmental pressure, climate crisis can push these changes and through these and parallel with this change in the society, CE can gain a place in the society as a principle to live by.
It can be seen from the study, the societal changes are needed for CE but other than that, societal changes are needed to understand its proposed value and capture value in the framework of CE. However, CE already has the needed additional value to propose more for the customer than the traditional business models. The study is not about measuring which company is better than the others, but it is about implementing a new economic system and showing to customers through its value proposition why do they need to change their own behaviour and showing that they can gain additional value through the new value proposition design, for example saving money and contributing to fight against climate change.

The new value proposition design was determined to show the interconnectedness – as one of the principles of circular economy – of CE and how the value proposition can change and operate correspondently to the requirements of CE. Value Proposition and the CEBM can be used as a shared language and create alignment throughout the whole organization while it evolves continuously. Constant measuring and monitoring is crucial to keep improving, especially in circular economy where constant innovation can help to keep more resources in the loop. Alignment creation is essential both on internal and external level. Explaining the necessity of the value proposition design for the stakeholders can help everyone to contribute and understand the system and create message to channel the new value to the costumer segment.
The remodelled VPD and its applicability is dependent on the company, its location, its profit, the employees and the receiving community.

Aquaculture as a primary industry, should have a more significant role in the discourse of circular economy, because as a non-manufacturing industry, the approach of the industry is important to produce sustainable and healthy food, in a way where the waste is less, the remaining resources or waste should be reused as biomass and most importantly not to exploit the ecosystem. Adapting CE principles in primary industries is more difficult due to the limited research on the adaptation and outcomes of CE and CEBM in primary industries.

To sum up, as it was stated in Chapter 7.2 the value proposition design in CEBM is more timeless and resilient value than value in traditional business models. Value proposition offers quantitative facts for a perceptive segment, where customer satisfaction is intuitive.
Successful companies recognize the gaps in their system and reinvent themselves regardless the business environment. Even the exploration of the new value proposition should be taken as seriously as moving on from the old one.
Innovation in the business model that has a large impact on the current society and customer behaviour is crucial during the extreme climate change and growing differences.

8.1 Recommendations

Based on the results of the study, the proposed new model of the value proposition design can lead into a direction where the value proposition is understood in a more circular way.
The company should build indicators worse that can lead the change in the value proposition design and measure the changes and the reactions of the customer segment constantly. The indicators and their fit should be monitored just as much the related targets, tracking, investigating and changing. The relentless improvement, investigation and experimenting give the core of the value proposition design. That means that the company should be able to risk an innovation even if it can be a failure too.
Because of that, a company should not wait for a crisis to improve itself and it should involve the customers in the processes and motivating their employers to give feedback and constantly criticize their products and services. They should use the customer experiences as a measuring stick to judge the innovations and their value proposition design.

8.2 Further possible research

Due to the limited research on CE and CEBM in primary industries can be an interesting research, where on-site interviews and interviews with more stakeholders can be conducted and test the remodelled value proposition design in aquaculture or in other primary industries.
Connected to that another research could be conducted on governmental policies connected to the implementation of CE in low- and high-income countries with and additional perspective of mixed-methods research in those communities where the polices have been analysed about the adaptability and the willingness of the implementation of innovations on an aggregated level.
In addition to that, the study could have elaborated more on that how value proposition and healthy ecosystem can be considered as human rights issue.

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