



# **Giving Discarded Reusable Items a Second Life:**

A Case-Based Waste Stream Treasure Hunt in the Norwegian  
Waste Industry within the Framework of Circular Economy.

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Master thesis, Economics and Business Administration, Strategy and  
Management

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This thesis was written as a part of the Master of Science in Economics and Business Administration at NHH. Please note that neither the institution nor the examiners are responsible – through the approval of this thesis – for the theories and methods used, or results and conclusions drawn in this work.

# Abstract

As the destructive environmental consequences of our economic system are becoming more and more apparent to us, researchers and citizens argue for a change in our economic system. One such change is the introduction of the circular economy, defined by the Ellen Macarthur Foundation (2013, p. 7) as “an industrial system which is restorative or regenerative by intension and design”. This thesis aims at contributing to reaching such an economy by investigating to what extent it is possible and profitable to take items out of the waste stream and give them a second life. It does so by first looking at whether there are functional/reusable items in Norwegian waste streams today. Secondly, the thesis looks at barriers and success factors for utilizing these items by preparing them for reuse.

The questions were answered by conducting five qualitative interviews with executives at four Norwegian recycling stations. Besides, one observational study at a typical Norwegian recycling station and four qualitative interviews with other actors that somehow contribute to preparing items for reuse were done. This was compared to and facilitated with an extensive literature review on preparation for reuse.

The results indicate that there are likely to exist reusable/functional items in Norwegian waste streams. Key barriers for utilizing these reusable/functional items seem to be the coupling of items between recycling stations and the customer, and lack of legislation that incentivizes preparation for reuse. The key success factor seems to be collaboration across industries, especially between recycling stations and social entrepreneurs.

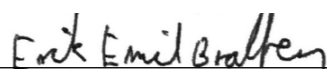
# Foreword

This master thesis is a part of my MSc in Economics and Business Administration with a major in Strategy and Management at the Norwegian School of Economics (NHH). The thesis was written in the fall semester of 2020.

I will offer my warmest gratitude to my supervisor Knut Ims. Your encouragement and constructive feedback in this sometimes stressful and chaotic period have been greatly needed and appreciated. Thank you also for allowing me to write about my childhood dream of starting a company that redistributes discarded items, not a conventional master thesis subject at the Norwegian School of Economics.

Thanks to the Lie family for constructive feedback on the thesis. Thanks to my own family and friends for facilitating other aspects of life. Thanks to my girlfriend, Mari, for your uplifting comments and facilitation in this special period. Thank you Fred for helping me with English grammar. Finally, a sincere thanks to my informants for voluntarily taking the time to participate in this study during what must be said to be some extraordinary months due to the Covid-19.

**Skudalen, 17<sup>th</sup> of June 2020**

A handwritten signature in black ink that reads "Erik Emil Bratten". The signature is written in a cursive style and is positioned above a horizontal line.

**Erik Emil Bratten**

# Contents

|  |            |
|--|------------|
| <b>Abstract</b> .....  | <b>i</b>   |
| <b>Foreword</b> .....  | <b>ii</b>  |
| <b>Contents</b> .....  | <b>iii</b> |
| <b>Figures</b> .....   | <b>v</b>   |
| <b>Tables</b> .....  | <b>vi</b>  |
| <b>1. Introduction</b> .....   | <b>1</b>   |
| 1.1 <i>Background</i> .....  | 1          |
| 1.2 <i>Delimitation and Research Questions</i> .....                                     | 5          |
| 1.3 <i>Disposition</i> .....   | 6          |
| 1.4 <i>Introducing Central Terms</i> .....   | 7          |
| <b>2. Literature Review</b> .....  | <b>8</b>   |
| 2.1 <i>Circular Economy</i> .....  | 8          |
| 2.1.1 <i>What is The Circular Economy?</i> .....   | 8          |
| 2.1.2 <i>What is The Value?</i> .....  | 11         |
| 2.1.3 <i>Sustainable Business Models</i> .....   | 12         |
| 2.2 <i>Circulation Economics</i> .....   | 12         |
| 2.3 <i>Summary and Comparison of Circulation Economics vs The Circular Economy</i> ..... | 15         |
| 2.3.1 <i>Comparing Sustainability and Circular Economy</i> .....                         | 15         |
| <b>3. Frame of Reference</b> .....   | <b>18</b>  |
| 3.1 <i>Two Theoretical Solutions</i> .....   | 18         |
| 3.2 <i>Value in Discarded Reusable Items</i> .....                                       | 19         |
| 3.2.1 <i>Value Uncaptured</i> .....  | 19         |
| 3.2.2 <i>Value in this Thesis</i> .....  | 20         |
| 3.3 <i>Processes for Extraction</i> .....  | 22         |
| 3.3.1 <i>Barriers and critical success factors</i> .....                                 | 22         |
| 3.3.2 <i>Waste Strategy in the European Union</i> .....                                  | 25         |
| <b>4. Methodology</b> .....  | <b>29</b>  |
| 4.1 <i>Norwegian Waste Industry</i> .....  | 29         |
| 4.2 <i>Research Design</i> .....   | 31         |
| 4.2.1 <i>Mixed Methods</i> .....   | 31         |
| 4.2.2 <i>Explorative Approach</i> .....  | 32         |
| 4.2.3 <i>Inspired by Case Study</i> .....  | 32         |
| 4.3 <i>Data Collection and Analysis</i> .....  | 33         |
| 4.3.1 <i>Data Collection</i> .....   | 33         |

|            |   |           |
|------------|---|-----------|
| 4.3.2      | Informants .....  | 34        |
| 4.3.3      | Analysis of the Interviews.....   | 37        |
| 4.4        | <i>Evaluation of the Research</i> .....   | 38        |
| 4.4.1      | Philosophy .....  | 39        |
| 4.4.2      | Reliability .....   | 39        |
| 4.4.3      | Validity.....   | 40        |
| 4.4.4      | Ethical Guidelines and Privacy Protection .....   | 42        |
| <b>5.</b>  | <b>Values- Results and Discussion</b> .....   | <b>43</b> |
| 5.1        | <i>Results</i> .....  | 43        |
| 5.1.1      | Observation at Haraldrud .....  | 43        |
| 5.1.2      | Unexploited Reusability.....  | 45        |
| 5.1.3      | Summary and Discussion .....  | 50        |
| 5.2        | <i>Discussion</i> .....   | 51        |
| 5.2.1      | Economic Value .....  | 51        |
| 5.2.2      | Social and Environmental Value .....  | 52        |
| <b>6.</b>  | <b>Processes- Results and Discussion</b> .....  | <b>54</b> |
| 6.1        | <i>Results</i> .....  | 54        |
| 6.1.1      | The Four Recycling Stations .....   | 54        |
| 6.1.2      | Actors Contributing to Preparing Items for Reuse.....   | 57        |
| 6.2        | <i>Discussion</i> .....   | 59        |
| 6.2.1      | Best Practice .....   | 59        |
| 6.2.2      | Barriers .....  | 62        |
| 6.2.3      | Critical Success Factors .....  | 64        |
| <b>7.</b>  | <b>Theoretical Discussion</b> .....   | <b>66</b> |
| 7.1        | <i>Within a Circular Economy</i> .....  | 66        |
| 7.2        | <i>Circulation Economics– Preparation for Reuse as a Miniature Example of a New Economy</i> ..... | 67        |
| 7.3        | <i>Should Social Goals be Included in Circular Economy Theory?</i> .....                          | 67        |
| <b>8.</b>  | <b>Conclusion</b> .....   | <b>69</b> |
| <b>9.</b>  | <b>Implications</b> .....   | <b>71</b> |
| <b>10.</b> | <b>Future Research</b> .....  | <b>72</b> |
| <b>11.</b> | <b>Limitations</b> .....  | <b>74</b> |
|            | <b>References</b> .....   | <b>76</b> |
| <b>12.</b> | <b>Appendix</b> .....   | <b>81</b> |
| 12.1       | <i>Appendix 1: Interview Guide</i> .....  | 81        |
| 12.2       | <i>Appendix 2: Information Sheet (Translated)</i> .....   | 82        |

# Figures

|   |           |
|---|-----------|
| <i>Figure 1: Reusable discarded items at Haraldrud recycling center in Oslo. Used with permission.....</i>  | <i>1</i>  |
| <i>Figure 2: The Waste Hierarchy, by the European Union. Adopted from European Waste Directive, 2008, 98. ...</i>   | <i>3</i>  |
| <i>Figure 3: Preparation for reuse. Adopted and adapted from Zacho et al (p. 299). ....</i>   | <i>4</i>  |
| <i>Figure 4: The Linear Economy. Adopted from Jørgensen and Pedersen (2018, p. 69).....</i>   | <i>9</i>  |
| <i>Figure 5: The Circular Economy, by the Ellen Mac Arthur Foundation (2013, p. 24).....</i>  | <i>10</i> |
| <i>Figure 6: Circulation Economics; an organic model. Adopted from Ingebrigtsen &amp; Jakobsen (2007, p. 111) ....</i>  | <i>13</i> |
| <i>Figure 7: Similarities between sustainability and circular economy, by Geissdorfer et al (2017).....</i>   | <i>16</i> |
| <i>Figure 8: Differences between sustainability and circular economy, by Geissdorfer et al (2017). ....</i>   | <i>17</i> |
| <i>Figure 9: From business as usual to a new economic system. Inspired by Geissdorfer et al (2017).....</i>   | <i>19</i> |
| <i>Figure 10: Adopted and adapted from Zacho et al (2018, p. 299).....</i>  | <i>21</i> |
| <i>Figure 11: The waste hierarchy, by the European Union. Adopted from European Waste Directive, 2008, 98 and inspired by Cole et al (2019, p. 418). ....</i> | <i>27</i> |
| <i>Figure 12: What is an action plan, by the European Union. Adopted from the European Union (2019).....</i>  | <i>28</i> |
| <i>Figure 13: Development of GDP and total waste in Norway, by Statistics Norway.....</i>   | <i>29</i> |
| <i>Figure 14: Reuse corners at Oslo Renovation Agency. Used with approval.....</i>  | <i>44</i> |
| <i>Figure 15: Picture taken of E-waste cage at Oslo Renovation Agency. Used with permission .....</i>   | <i>47</i> |
| <i>Figure 16: Picture from Haraldrud. Used with permission.....</i>   | <i>60</i> |
| <i>Figure 17: Preparation for reuse development at Oslo Renovation Agency. Gathered from Oslo Renovation Agency Yearly rapport (2019, p. 6).....</i>          | <i>61</i> |

# Tables

|  |           |
|--|-----------|
| <i>Table 1- Introducing central terms .....</i>  | <i>7</i>  |
| <i>Table 2: Mechanistic versus organic worldview. Adopted from Ims and Jakobsen (2007, p. 22.).....</i>    | <i>14</i> |
| <i>Table 3: Research on barriers and success factors for a higher reuse extent. ....</i>                   | <i>23</i> |
| <i>Table 4: Informants response to whether there exist unexploited values in the waste stream .....</i>    | <i>46</i> |
| <i>Table 5: Waste management research on the unexploited reusability, mainly on EE-waste streams .....</i> | <i>48</i> |
| <i>Table 6: Social entrepreneurs gathering items from Oslo Renovation agency, Source: Gitte .....</i>      | <i>55</i> |

# 1. Introduction

This thesis investigates preparation for reuse, which means collecting, checking and preparing discarded items for a new life. First, the thesis argues that there are reusable items being thrown away in Norway, representing an unexploited value. Secondly, the thesis addresses how to utilize these resources. The thesis studies all product categories because of the “chaos” related to reusable items in the waste stream. Waste Electrical and Electrical Equipment (WEEE) becomes a natural focus area because of the increasing size of such waste streams and the use of scarce resources in such products (Balde, Wang, Kuehr and Huisman, 2015).

The thesis aims to contribute to the 12<sup>th</sup> United Nations goal- responsible consumption and production. Especially relevant is subgoal 5 - substantially reduce waste generation through prevention reduction, recycling and reuse by 2030. This is achieved through opening up a research field on discarded items, and possibly following up with a PhD.

In the following section, an elaboration of my motivation in the chosen subject, and actualization of preparation for reuse will be presented. The section further aims to nourish the intellectual curiosity of the reader, to state the research question and draw the limitations.

## 1.1 Background



Figure 1: Reusable discarded items at Haraldrud recycling center in Oslo.  
Used with permission.

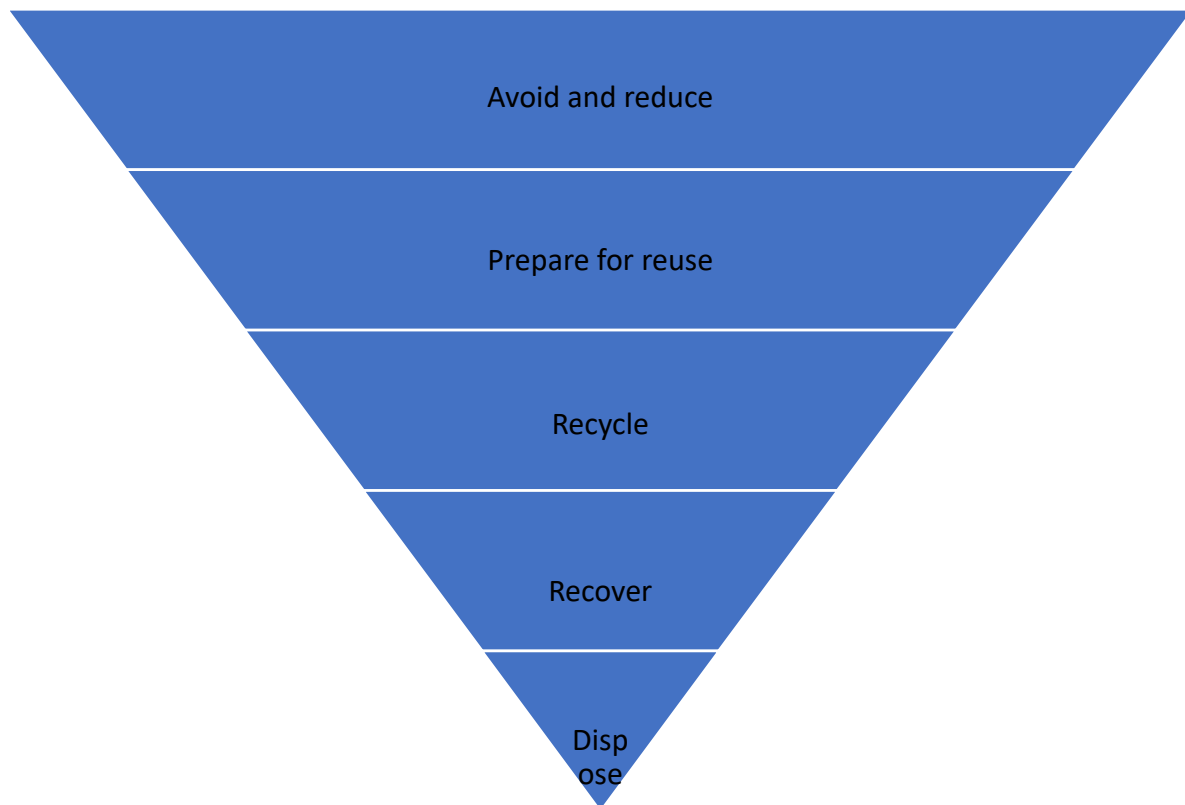


The picture above is taken at Haraldrud, one of Oslo Renovation Agency's five recycling stations. It shows discarded, but seemingly reusable furniture. Were it not for the processes in place at Haraldrud- enabling these discarded items to be reused, this furniture would have been sent to incineration.

I have been fascinated by the number of reusable products that get thrown away in Norway since I was a little boy. Especially, I was interested in the economic potential and whether it was possible to start a business reselling these items. Reading Norwegian news articles, it seemed like redistributing discarded items were a million-dollar business. There were articles with headlines such as “ Second hand store sells for millions” (Tone Afret 2017, my translation) and “Selling used products yield huge profits” (Terje Andresen 2014, my translation). Why couldn't a system be made that redistributed these items, saving the environment while making a profit?

In 2019 we used up the earth's resources on the 29 of July (Earth Overshoot day). This day is coming closer and closer to January each year. To make matters worse, if every consumer lived as a Norwegian consumer, the earth overshoot day would be on the 26 of April.

As a consequence of these problems, many argue for a more circular economy. In fact, in March 2020, the European Union Launched a proposal for “A new circular economy action plan” (European waste directive 98, 2020). This action plan is a part of the new green deal, in which the European Union aims to become climate-neutral by 2050.



*Figure 2: The Waste Hierarchy, by the European Union. Adopted from European Waste Directive, 2008, 98.*

A circular economy can be defined as "an industrial system which is restorative or regenerative by intention and design" (EMF 2013, p. 7). A part of the European Strategy for reaching a circular economy is the waste hierarchy which is shown in figure 2 above. In 2017, 40% of Norwegian waste was materially recycled and 33% energy recovered. This constitutes an overall recycling rate of 73% in Norway (Statistics Norway, 2020). Thus, the quality of Norwegian recycling stations can be said to be fairly high. In fact, Norway is among the top eight European countries when measuring recycling rate (Eurostat, 2020).

While this indicates that the recycling degree in Norway is relatively high, research needs to be done on preparation for reuse. Despite the increasing focus on this area from the European Union, Norwegian recycling stations are not officially measured on their reuse activity (Haugedal and Syversen 2019). From a waste management perspective, innovation in the recovery phase of the End of Life (EoL) is crucial for making a robust circular economy and research attention should therefore be given to this area (Tam, Soulliere and Sawyer- Beaulieu 2019, p 124).

Preparation for reuse can be defined as “checking, cleaning or repairing recovery operations, by which products or components of products that have become waste are prepared so that they can be re-used without any other pre-processing” (European Waste Directive 98, 2008, art 3. no 16). The attractiveness of preparation for reuse in terms of value creation compared to other waste handling solutions is illustrated in figure 3.

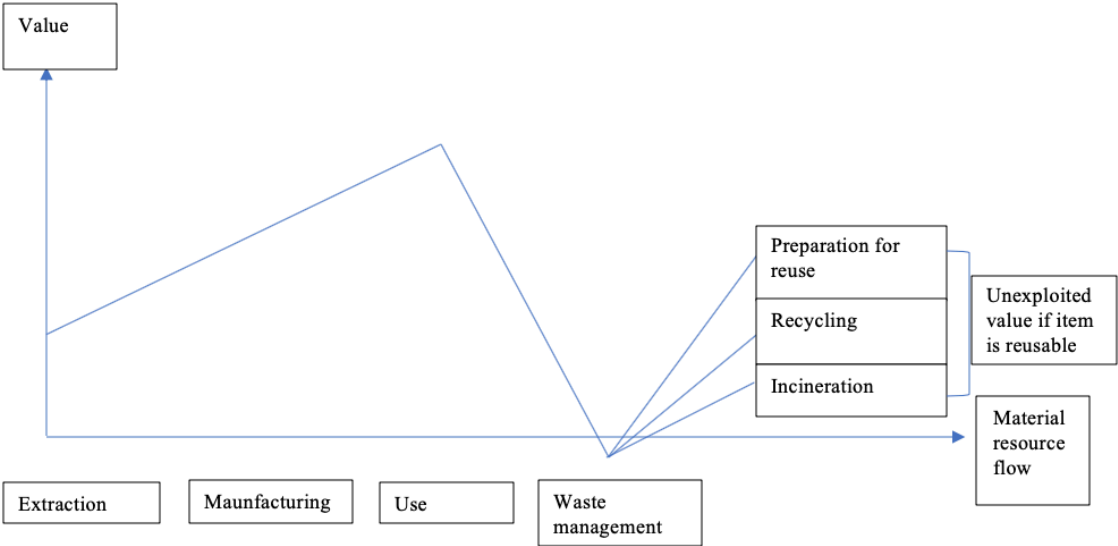


Figure 3: Preparation for reuse. Adopted and adapted from Zacho et al (p. 299).

Figure 3 is adapted by adding of the box “Unexploited value if item is reusable”. As will be shown this thesis will look at whether there actually exists such unexploited values in Norwegian waste streams.

Achieving a circular economy includes a myriad of unanswered questions, and many research fields work towards achieving such an economy. Research attention are given to create sustainable business models (Jørgensen and Pedersen 2018; Bocken, Pauw, Bakker and Grinten 2016) and on how to make consumers make green choices (White, Habib and Hardisty 2019; Steg and Vlek 2009).

Following my childhood dream of selling discarded items, this thesis looks at waste. Waste is defined as “any substance or object which the holder discards or intends or is required to discard» (European Waste Directive 98, 2008, art 3. no 16). More specifically, this thesis looks at preparation for reuse which means “checking, cleaning or repairing recovery operations, by which products or components of products that have become waste are

prepared so that they can be re-used without any other pre-processing» (European Waste Directive 98, 2008, art 3. no 16).

## 1.2 Delimitation and Research Questions

In general, household waste that you and me throw away take two routes to the waste company. One route is through the everyday delivery of household waste. This garbage is picked up by the recycling stations, normally by a garbage truck. This items are crushed, giving little potential for reuse.

This paper therefore looks at the second route to waste, where customers deliver waste to the recycling station. This often includes heavier objects such as sofas, refrigerators, and so on. Since the solutions investigated in this thesis are based on these recycling stations, and because these stations take both private and industrial waste (Norwegian Environmental Agency 2020, 10), my thesis looks at household and industrial waste.

The aim of this research is to explore the unexploited values and processes for extraction of reusable items that end up at Norwegian recycling stations. First, I ask whether there are items that end up at Norwegian recycling stations that are reusable and therefore should have been prepared for reused but are not. This would be an unexploited value. Secondly, I ask how these items can be prepared for reuse.

Values can be either intrinsic or instrumental. Intrinsic values referring to things that are good of their kind or good in themselves, instrumental referring to items that are good as a means to an end (Charles Baylis 1958). My study will look at discarded reusable items and their instrumental value consequences.

My main research question is:

“What is the unexploited value(s) in discarded reusable items, and how can they be utilized?”

To help structure the thesis, the research questions are divided into three subquestions. The three subquestions are:

1. Are there reusable items in Norwegian waste streams that could have been reused but are not?
2. How can the reusable items be prepared for reuse?
3. How do the practical results of this study fit into the normative circular economic theory?

### 1.3 Disposition

My thesis is structured so that each of the three subquestions above are answered chronologically throughout the thesis. Question one will be addressed in chapter five. Question two will be addressed in chapter six. Finally, question three will mainly be addressed in chapter seven.

First, chapter two presents literature on two theoretical positions, namely Circulation Economics by Ingebrigtsen and Jakobsen (2007) and The Circular Economy by The Ellen Mac Arthur Foundation (2013). Chapter three narrows this theory, creating a frame of reference that will be used in the discussion's. Here, theory on value and EU waste strategy are also presented. Chapter four presents the Norwegian Waste Industry as the context of the thesis. This is followed by research design, data collection and analysis, and evaluation of the research.

Finally, chapter five presents the results and discussion related to whether there exists unexploited values in Norwegian Waste Streams. This is the main presupposition underlying this thesis and it is therefore natural to answer subquestion 1, first. Chapter six follows up by discussing how these values can be exploited, answering subquestion number 2. Finally, chapter seven discusses how these practical findings fit into the normative circular economy, answering subquestion number 3.

## 1.4 Introducing Central Terms

The aim of table 1 is to give the reader a basic understanding of the different concepts being used in this thesis. The definitions are made by the author himself, and therefore represents my interpretation of the terms as they are used in this thesis. A more nuanced definition of the terms and their source of origin will be presented throughout the thesis.

|                                       |  |
|---------------------------------------|--|
| <b>Recycling</b>                      | Material recycling and Energy recovery   |
| <b>Material recycling</b>             | Using material from waste as raw material input in the production of new goods.                                    |
| <b>Incineration (Energy recovery)</b> | Burning items and utilizing the heat from this activity  |
| <b>Waste</b>                          | Items that are discarded or intended to be discarded by the owner.   |
| <b>Preparation for reuse</b>          | The activity of preparing waste to be given a second life.   |
| <b>Reuse</b>                          | Using an item again in its original form.  |
| <b>Circular economy</b>               | An economy that is designed to use items again and again, as opposed to a linear economy where items become waste. |

Table 1- Introducing central terms

## **2. Literature Review**

This chapter presents different positions about the circular economy and circulation economics as possible solutions to our environmental problems. It describes what a circular economy is by presenting The Ellen Macarthur Foundation (EMF, 2013) and circulation economics by Ingebrigtsen and Jakobsen (2007).

It will be shown that one difference between these two positions is that circular economy focuses mainly on economic profit and environmental gain, while circulation economics resembles sustainability literature and are more adaptive, abstract, and broad in its goals. These theories and the differences between them will be discussed in chapter 7. This chapter also serves as a theoretical background and is used to put the results into a suitable theoretical framework.

### **2.1 Circular Economy**

This section presents the circular economy as a new and normative alternative to our existing economic model. The aim of this section is not that the reader should memorize its contents for its use in the analysis chapter. Rather, this theory sets the stage for the discussion and puts the results into the appropriate theoretical subject area. The section starts by explaining the circular economy as opposed to its counterpart- the linear economy.

#### **2.1.1 What is The Circular Economy?**

To understand what a circular economy is, it helps to contrast it with the linear economy. The linear economy can be said to be the economy that dominates the current state of the world. Its fundamental characteristic is that it follows a take-make-waste pattern ( Ellen Mac Arthur Foundation 2013, p. 6). This linear economy is nicely illustrated by Jørgensen and Pedersen (2018, p. 69).

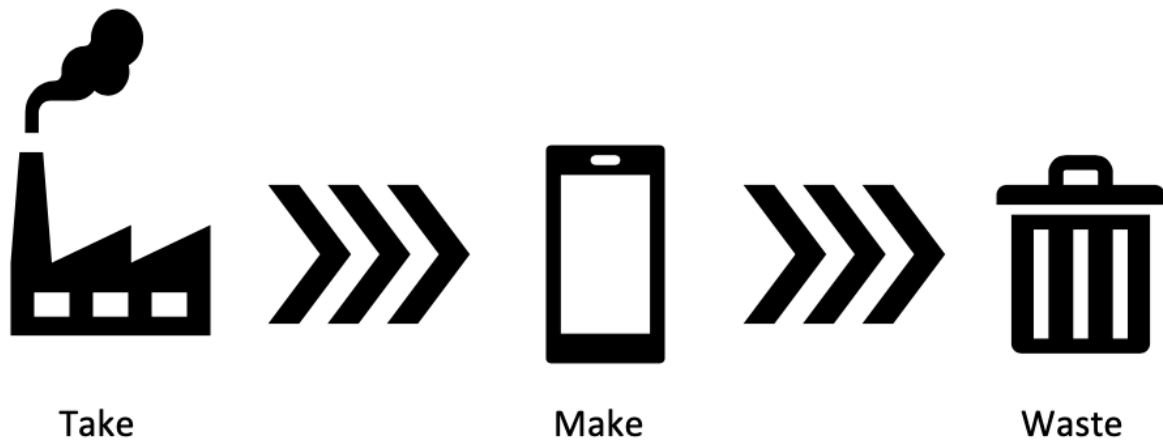


Figure 4: The Linear Economy. Adopted from Jørgensen and Pedersen (2018, p. 69)

The linear economy appeared as a consequence of the industrial revolution (EMF 2013, p. 6). The term industrial revolution refers to the rapid industrialization in Europe during the late 18<sup>th</sup> century (Schrumpf, Bull & Tvedt, 2019). The period marks the end of the pre-industrial period in which items were produced by families or individuals, mainly for self-consumption, to the industrial era where production was moved to large scale factories. This change in production as well as the development of modern means of transport such as railways, and steamships, lead to the modern production and social conditions that we see today. As a consequence of this shift, many goods became so cheap that people found it more convenient to buy them than to make it themselves (Schrumpf, Bull & Tvedt, 2019).

As an alternative to the linear economy, the circular economy is becoming increasingly popular (Jørgensen and Pedersen 2018; Geissdorfer, Savaget, Bocken and Hultink 2017). While many definitions exist, I choose to build this thesis on the definition by the Ellen Mac Arthur Foundation, being a proven and highly influential enabler of good descriptions and illustrations of the circular economy (Geissdorfer et al 2017). A good figure for illustrating the complete and nuanced picture of a circular economy is depicted in figure 5.



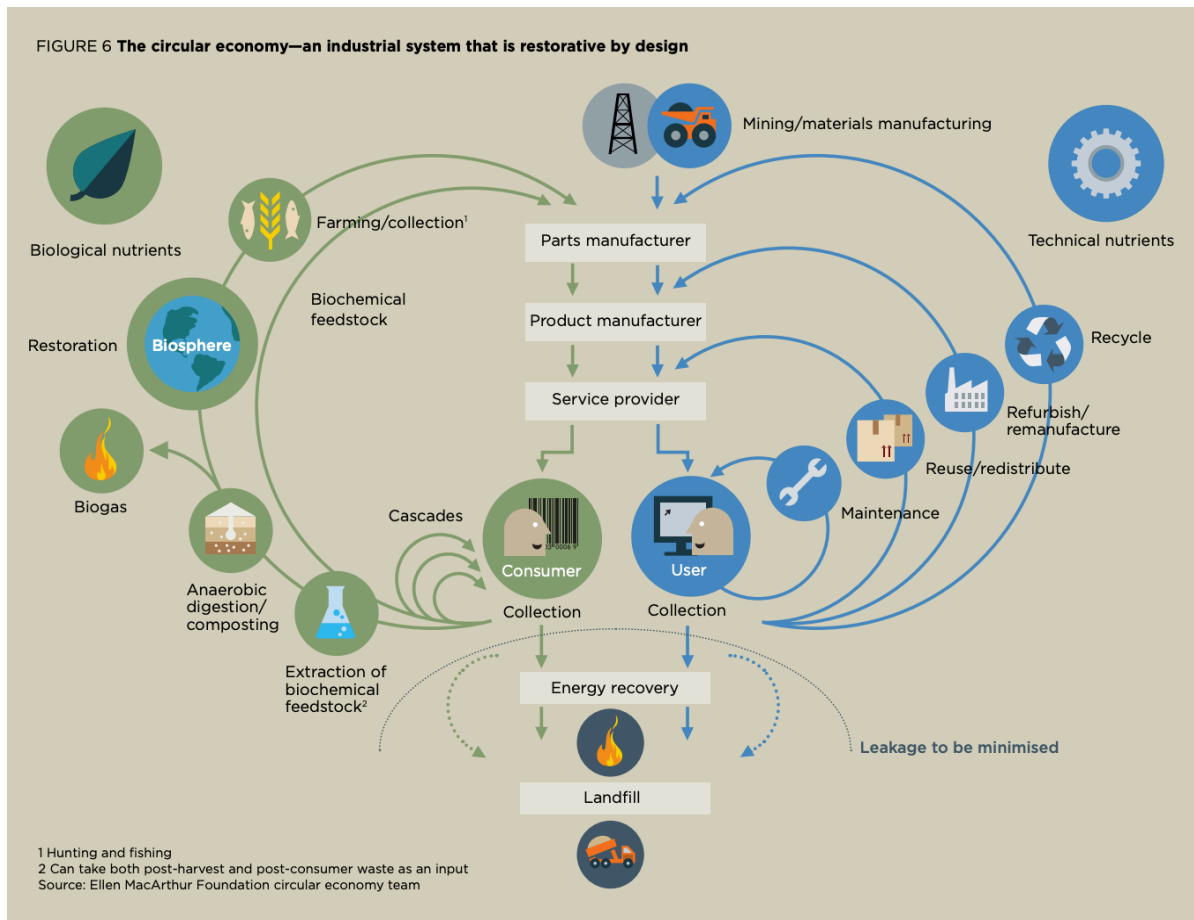


Figure 5: The Circular Economy, by the Ellen Mac Arthur Foundation (2013, p. 24)

According to the EMF (2013, p. 7), the circular economy aims at an economy where waste is designed out. To manage this, the normative circular economy separates between consumable and long-lasting components.

Consumable products would in a circular economy be made of biological ingredients or nutrients which are non-toxic. These items can be returned safely to the biosphere. These products, and how they circle, are shown on the left side of figure 5.

Long-lasting components, such as engines or computers would be made out of technical nutrients which cannot be returned to the biosphere, for example, metal or plastic. These will from the start be designed for reuse, enabled by new kinds of sustainable business models. These products, and how they should circle, is shown on the right side of figure 5.

Finally, the energy that is being used in the production of these consumable and long-lasting products will be renewable to reduce resource dependency and thereby giving the system resilience against, for example, an oil shock (Emf 2013, p. 7).

According to EMF (2013, p. 7), “a circular economy is an industrial system which is restorative or regenerative by intention and design.” This thesis follows this definition, stressing that the circular economy represents an alternative and normative economy.

Although it is an alternative economy, many authors point to the increasing popularity of this theoretical solution. Jørgensen and Pedersen (2018) show real-life cases of businesses starting to become more circular. Geissdorfer et al (2017, p. 67) show that the number of publications on the circular economy has had a more than tenfold growth in the last ten years. Furthermore, countries such as China have implemented strong regulatory measures to achieve a more circular economy, followed by the European Union (Geissdorfer et al 2017).

### **2.1.2 What is The Value?**

According to a report by McKinsey (2015), a transition towards a circular economy in Europe, as defined by the Ellen Mac Arthur Foundation(2013), could lead to a seven percent yearly increase in GDP by 2030, compared to the existing linear economy. The main reason for this being a better utilization of resources. As exemplified in the report (p. 12), the average European car is parked 92% of the time, 31% of food is wasted, and the average European office is used 35-50% of the time during office hours. Thus, better utilization of these unexploited resources has economic and environmental potential.

Building on figure 5, there are four simple principles of “circular value creation that holds true” (Emf 2013, p. 30). Within these four principles, the main values that are created are reduction of costs and negative externalities- such as greenhouse gas emissions, water usage and toxicity (EMF 2013, p. 30). Note that this implies that the main value is economic and environmental.

The first is the one that is relevant for this thesis. This value creation principle is the power of the inner circle. As illustrated in figure 5, resources are best utilized when the product circles as close to the customer as possible. Therefore, reuse is preferred over recycling. The tighter the circle, the lower the cost of labor, energy, and capital, as well as the associated externalities (EMF 2013, p. 30). The authors further argue that this logic (better-utilizing of resources) is at the heart of the economic potential in the circular economy.

### 2.1.3 Sustainable Business Models

The growing interest in the circular economy has also yielded a growing interest in sustainable business models to operationalize this phenomenon from a business perspective. But what are sustainable business models? Bocken et al (2016) did a literature review on circular product design and circular business models.

They ended up with three different categories of sustainable business models. Closing, narrowing and slowing resource loops. Closing loops is about recycling and thereby closing the gap between post-use and production. Narrowing resource flows is about resource efficiency and using fewer resources per product. Finally, slowing resource loops is about “designing long-life products” and “designing for product life extension” (Bocken et al 2016, p. 309). Since this thesis is about preparation for reuse, it is about extending the life of products which are already produced in the “linear” economy.

## 2.2 Circulation Economics

This section builds upon “Circulation Economics” by Stig Ingebrigtsen and Ove Jakobsen (2007). They argue that we must have a holistic viewpoint if we are to make the necessary changes towards saving our planet. As stated by the authors: “... circulation economics presupposes some clearly defined changes in the basic theoretical foundation of mainstream economics” (Ingebrigtsen & Jakobsen 2006, p. 66).

Thus, Ingebrigtsen and Jakobsen (2006, p. 67) argue that a change in the worldview is necessary for implementing circulation economics. To illustrate this, they refer to Copernicus, who in the early 16<sup>th</sup> century replaced the geocentric conception of reality with the heliocentric model. By doing this, Copernicus changed the way we look at the world today from believing that the earth is the center of the universe (geocentric) to the fact that the earth is one planet among many others circling the sun (Ingebrigtsen and Jakobsen 2006, p. 67). This dramatic but needed change in worldview can be summarized in figure 6:

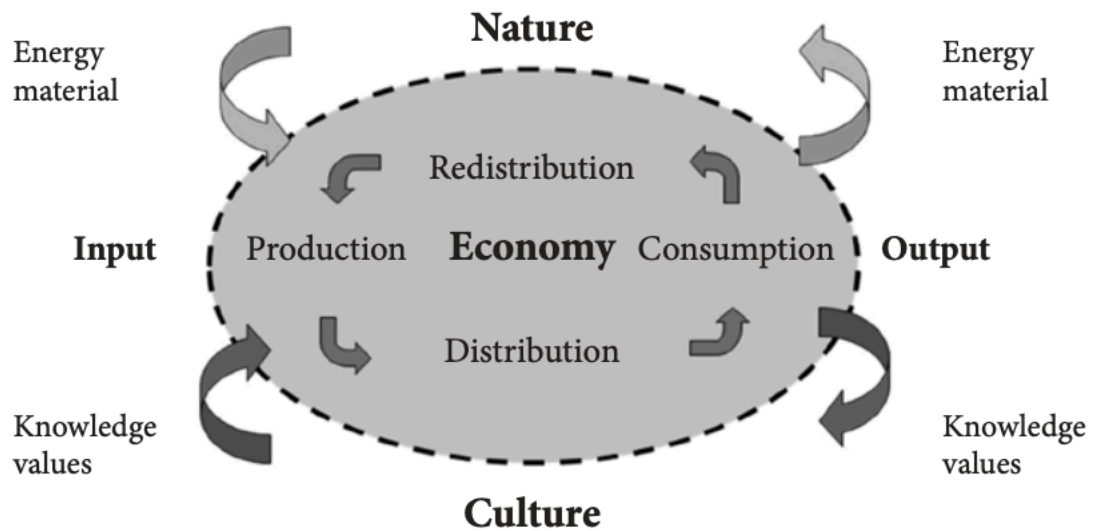


Figure 6: Circulation Economics; an organic model. Adopted from Ingebrigtsen & Jakobsen (2007, p. 111)

As can be seen in figure 6, there is an interplay between the “context variables” nature, economy, and culture. Ingebrigtsen & Jakobsen (2007, p. 88) argue for “the triple helix”- that sustainable development presupposes that the three sectors are sustainable both individually and in interaction with each other. This means that nature must not be exposed to excessive consumption of resources or pollution. Culture must not be exposed to strain(force). Finally, and as seen in the model above, they advocate that we need to understand how the various partial systems (nature, economy and nature) function and how the interaction between them functions (Ingebrigtsen and Jakobsen 2007, p. 88).

The first step in reaching circulation economics is to change from a mechanical to an organic world view. Ingebrigtsen & Jakobsen (2007, p. 68) argue that mainstream economics lacks a holistic view and that the mainstream thinkers, therefore, cannot grasp the idea of sustainability. The main difference between the organic and mechanic world view is:

| Mechanistic worldview  | Organic worldview                                |
|--|--|
| The market consists of isolated, egocentric actors (atomism)           | Individuals and society are inter-woven (holism) |
| The market is regulated through instrumental, externally defined norms | Internalized values and norms are essential      |
| Competition  | Cooperation                                      |
| Competition anchored in productivity and efficiency                    | Communicative action to reach a common goal      |
| From private vices to public virtues.                                  |  |

Table 2: Mechanistic versus organic worldview. Adopted from Ims and Jakobsen (2007, p. 22.)

In addition to a shift in worldview, a shift towards a circular economy is necessary. A circular economy is a system that wants to decrease the use of raw material and waste. A circular economy was described in section 2.1.

Thirdly, the authors argue for collaboration. “Competition between autonomous actors in the market has a fundamental standing in “mainstream” economics” (Ingebrigtsen & Jakobsen, 2007, p. 81). According to Adam Smith, such egocentric actions will turn to the best for society because of “the invisible hand”. As pointed out by the authors (Ingebrigtsen and Jakobsen 2007, p. 82) there is increasing evidence that the principles of interaction between the various life forms found in nature are characterized by “collaboration rather than competition”.

Finally, Ingebrigtsen and Jakobsen (2007, p. 92) argue that “the new economy, which is part of a close interaction between both nature and culture, cannot be based on a one-dimensional value system based on money”. They instead argue that it is necessary to separate economic, ecological, and culture related values of the economy. The goal is to contribute to reaching sustainable social development. Therefore, the interaction between the three systems should be coordinated within the framework of a communicative arena.

## 2.3 Summary and Comparison of Circulation Economics vs The Circular Economy

The theory chapter started by giving an account of the circular economy as defined by the Ellen Mac Arthur Foundation (2013). This was followed by presenting “Circulation Economics” by Jakobsen & Ingebrigtsen (2007). This chapter aims at comparing these two theories. This is done by building on a bibliometric analysis of the differences and similarities between circular economy and sustainability by Geissdorfer et al (2017). Building on these differences and similarities, the chapter argues that circulation economics has many of the characteristics of sustainability. The following section presents Geissdorfers (2017) results and compares this with circulation economics and the circular economy.

### 2.3.1 Comparing Sustainability and Circular Economy

Geissdorfer et al (2017) conducted a bibliometric analysis of the circular economy and sustainability and compared the differences and similarities between them. They found the following similarities between the two.

| <b>Similarities between Sustainability and the Circular Economy</b>           |
|---|
| <b>Intra and intergenerational commitments</b>                                |
| <b>More agency for the multiple and coexisting pathways of development</b>    |
| <b>Global models</b>  |
| <b>Integrating non-economic aspects into development</b>                      |
| <b>System change/design and innovation at the core</b>                        |
| <b>Multi-/interdisciplinary research field</b>                                |
| <b>Potential cost, risk, diversification, value co-creation opportunities</b> |
| <b>Cooperation of different stakeholders necessary</b>                        |
| <b>Regulation and incentives as core implementation tools</b>                 |

**Central role of private business, due to resources and capabilities**

**Business model innovation as key for industry transformation**

Figure 7: Similarities between sustainability and circular economy, by Geissdorfer et al (2017)

From figure 7, it can be concluded that both sustainability and circular economy see regulation and incentives, collaboration and business model innovation as key for reaching a new and better economy. Furthermore, both are interdisciplinary research fields.

Geissdorfer (2017) also looked at differences between the circular economy and sustainability. This is summarized in figure 8.

|  | 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. European 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 àreflexivity and adaptive --> past trajectories  | Better use of resources, waste, leakage (from linear to circular)  |
| What system is prioritized?                                  | 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 or fairer taxation |
| How did they institutionalize (wide diffusion)?              | Providing vague framing that can be adapted to different contexts and aspirations.  | Emphasizing economic and environmental 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 optimization 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, organizational profits, and consumer prices | Economic/financial advantages for companies, and less resource consumption and pollution for the environment   |

Figure 8: Differences between sustainability and circular economy, by Geissdorfer et al (2017).

As can be seen, the circular economy differs from sustainability in that it focuses more on the benefits from the economic actor's point of view. Sustainability, on the other side, sees the environment, society and economy as equally important, or horizontal (Geissdorfer et al 2017).



### 3. Frame of Reference

This sections aims to further delimitate the theoretical base of this paper. It does so by presenting three reference frames. These are used as basis for the discussion later in this thesis, and relate to the subquestions presented in 1.2. I will start by presenting the theoretical reference frame related to creating a new economy. This will be used throughout the paper, and especially in chapter seven. After this, a reference frame for discussing value will be described. Finally, success factors and barriers will be presented..

#### 3.1 Two Theoretical Solutions

Circulation economics by Ingebrigtsen and Jakobsen (2007) argue for a more fundamental change than the circular economy as defined by the Ellen MacArthur Foundation (2013). Although they are based on some of the same principles, such as considering the interconnectedness of nature, culture, and economy, the instrumental value gains underlying the circular economy is the economic gain of such models from the business perspective (Geissdorfer 2017). Further, circulation economics goes deeper and is, therefore, more pessimistic in the sense that they do not simply see a circular economy as enough for tackling the social and environmental problems of our time.

In my view, there are many similarities between Ingebrigtsen and Jakobsen (2007) and the sustainability literature identified by Geissdorfer et al (2017). Circulation economics is, therefore, throughout this thesis, seen as belonging to sustainability literature.

The following model represents my interpretation of the different “schools of thought” in my reference frame. This is based on Geissdorfers (2017) bibliometric analysis of the difference between sustainability and circular economy.

In the left corner of the spectrum, Adam Smith represents a framework where the business should only care about economic benefits, the reasoning being that the person that sells bread is crucial for the economic prosperity and well-being of the community. In contrast, the other side of the model is represented by the degrowth movement.

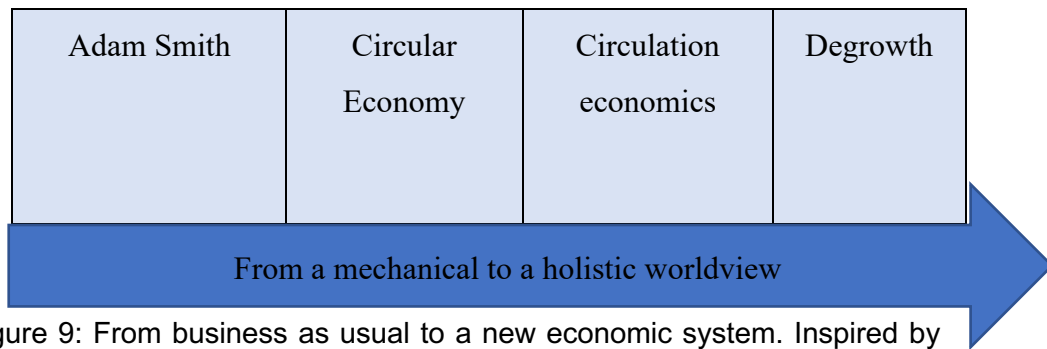


Figure 9: From business as usual to a new economic system. Inspired by Geissdorfer et al (2017)

The purpose of using Adam Smith and Degrowth in figure 9 is to illustrate my interpretation of the different degrees' of “change needed” for the respective theoretical solutions to our environmental crisis. Figure 9 builds on Ims and Jakobsen (2007) reflections regarding mechanic vs organic framework and Geissdorfers (2017) bibliometric analysis about the difference between sustainability and circular economy.

## 3.2 Value in Discarded Reusable Items

This section aims to serve as a basis for the value discussion in chapter 5. It does so so by presenting value uncaptured as described by Yang, Evans, Vladimirova and Rana (2007). This is followed by an elaboration of what value is in this thesis.

### 3.2.1 Value Uncaptured

A central part of this study is the value of reuse. Inspired by the academic field of sustainable business models, Yang et al (2017, p. 1796) propose a new way of looking at value. In this perspective, value is not only for the customers and the firm but for all stakeholders such as end-users, suppliers, shareholders, government and partners. In this view, they present four different types of “value uncaptured”.

Value surplus (VS) is value that exists but is not required (demanded). It is things and or activities that are more than needed. Examples include such things as waste of resources in a company or unnecessary value delivered to stakeholders (Yang et al 2017, p. 1797).

Value absence (VA) is value that is required (demanded) but does not exist. They are things or activities that are needed but are not required. Let’s say that for a short period, there is a

need for storing bicycles. If companies do not provide for this need, there is a value absence. In other words, there is a demand that is not being supplied.

Value missed (VM) is value that exists and is required(demanded) but is not exploited. It could create more value, but it does not. It could be considered waste that has high value but is not used.

Value destroyed (VD) is value with negative outcomes. It causes negative effects for the company or other stakeholders.

To summarize, there are four different forms of uncaptured value. Value surplus- where value exists but is not demanded. Value absence, where value is demanded but not delivered. Value missed where value exists and is demanded but is not exploited. Finally, value destroyed is value with negative outcomes.

### **3.2.2 Value in this Thesis**

According to (Soanes & Hawker, 2006), the word “value” can refer to; “1. The amount of money that something is worth: 2. The importance or worth of something: he realized the value of education. 3 (values) beliefs about what is right and wrong and what is important”.

Building on reference one and two, this thesis separates between economic value and exploited and unexploited reusability. Furthermore, this thesis is interested in the instrumental value that appears as a result of an item being reused or not. Two terms are especially essential for the value discussed in this thesis.

1. Reusability in this thesis refers to whether the items can be used again. Building on Zacho, Mosgaard and Riisgard (2018), this is dependent on the subjective assesment of the accessor, since what can be waste for one person can be a valuable item for another. Reusability also depends on functionality of the discarded item. This can be measured objectively, as will be shown in chapter 5.
2. Economic value is used in this thesis to discuss both the costs and economic potential related to preparation for reuse activities. Thus, relating to how much money the reusable items is worth from the perspective of an actor wanting to make economic profit.

Furthermore, this thesis builds on the notion of value uncaptured (Yang et al 2017) and proposes that reusable items can be exploited or unexploited. As illustrated in figure 10, an item that is reusable but are not prepared for reuse would represent an unexploited value. This would be the equivalent to value missed (Yang et al, 2017), where value exists and is demanded but are not utilized.

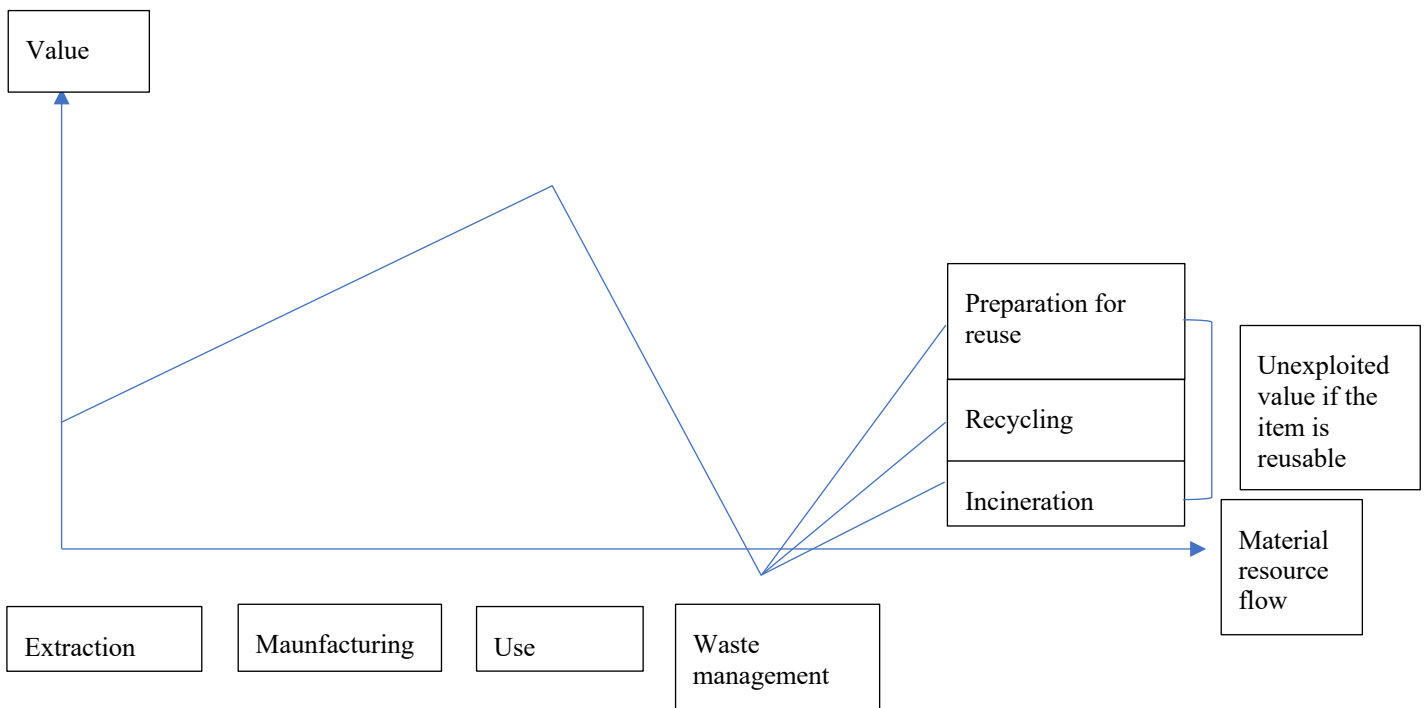


Figure 10: Adopted and adapted from Zacho et al (2018, p. 299)

Value in the case of reusable items is dynamic for two reasons. First, what is considered waste by someone can be a valuable item for others (Zacho et al 2018). In addition, the value of the discarded item is dependent on which waste management strategy is used (Zacho et al 2018). As seen in figure 10, if a reusable item is not prepared for reuse but sent to recycling or incineration, this constitutes an unexploited value.

Figure 10 is adopted from Zacho et al (2018). “Unexploited value if the item is reusable” has been added to this model, and it is therefore “adapted”. This was added to illustrate what unexploited value means in this thesis. In chapter 5, this thesis discuss whether such unexploited values exists in Norwegian waste streams.

## 3.3 Processes for Extraction

This section builds on earlier critical success factors and barriers for enhancing preparation for reuse degree as identified in waste management research in other countries than Norway. This is followed by a presentation of the European Waste Strategy, including the waste hierarchy. Overall, these elements are seen as relevant processes for extraction of the reusable items.

### 3.3.1 Barriers and critical success factors

A barrier is a wide term that can be used in different settings. Historically, the word denoted a fortification defending an entrance. Today, a barrier can be defined as; “ A problem, rule, or situation that prevents somebody from doing something, or that makes something impossible”(Oxford dictionary, undated). In this section, a barrier refers to something that serves as an obstacle for achieving a higher preparation for reuse degree

Critical success factors can be defined as “ one of the most important things that a company or organization must do well in order for its business or work to be successful” (Cambridge dictionary, undated). In this section, success factor is seen as the most critical factors for enhancing the reuse degree.

The studies looking at critical success factors and barriers for achieving a higher reuse extent do it from two perspectives, the waste management perspective and the entrepreneur perspective. This thesis addresses barriers and critical success factors by combining these views. Barriers and critical success factors are presented in the same section because some of the authors present both and some present just one. A summary of this research can be seen in table 3. After presenting this table, an elaboration will be made on the context and methodology of this literature.

| From who's perspective?                    | Country   | Methodology  | Items  | Barriers  | Success factors  |  |
|--|---|--|--|---|--|--|
| <b>Waste management</b>                    | UK  | Expert opinion along the reuse value chain                       | WEEE   | More expensive than recycling<br><br>Lack of access to usable products          |  | Cole, Gnanapragasam, Cooper and Singh (2019) |
| <b>Waste management and entrepreneurs.</b> | Ireland and other EU countries<br><br>Austria<br>Belgium<br>Spain<br>France<br>United Kingdom | Interviews and comparison between successful European countries. | WEEE   |   | Involving social entrepreneurs<br><br>Providing these with access as close to the end user as possible<br><br>Facilitating a good relationship between preparation for reuse organization and producer representative organizations. | McMahon, Johnson and Fitzpatrick (2019)      |
| <b>Entrepreneurs</b>                       | Africa<br>Latin America<br>North America<br>Europe (43%)                                      | Semi structured in depth interviews with management.             | WEEE<br><br>-ICT and large household appliances  | Difficulties accessing usable items.<br><br>Lack of legislation and incentives: | Control and securing of product and process quality  | Kissling et al (2013)                        |
| <b>Entrepreneurs</b>                       | Austria   | Case study of reuse entrepreneurs                                | All items that and up as waste and are reusable. |   | 1. Customers<br>2. Collaboration<br>3. Support from authority and NGO'S  | Gelbmann and Hammerl (2015)                  |

Table 3: Research on barriers and success factors for a higher reuse extent.

Taking the waste management perspective, Cole et al., (2019) looks at how well the UK is doing with regards to e-waste movement up the waste hierarchy. By conducting qualitative in-depth interview with 30 experts along the E-waste value chain, they find that the waste electrical and electronic equipment directive (EU Waste Directive 2012) incentivizes recycling over re-use in the UK (Cole et al 2019, p. 422). This is, as also mentioned by the

author, in contrast with the previously described waste hierarchy which favors reuse and preparation for re-use. Thus, the author and his informants argue that there is a gap between what the European Union wants (their strategy) and their incentivizing in the context of e-waste. He concludes, therefore, that separate preparation for reuse targets should be developed (Cole et al 2019, p. 425).

McMahon et al., (2019) take a multinational approach trying to find out what Ireland can do to improve their preparation for reuse of WEEE. The informants consist of both preparation for reuse organizations and other “stakeholders” such as producer responsibility actors. They found the following success factors; 1. Involving social enterprise. 2. requiring the use of quality standards, giving “preparation for re-use organizations” access to the products as close to the end-user as possible. Finally, it was important with a close relationship between “preparation for re-use organizations” and the producer representative organizing the waste streams (McMahon et al, 2019, 1005). Finally, the authors recommend these factors to be supported in those countries not having significant levels of preparing for re-use. They also find that preparation for reuse is resisted in European countries because they do not have a tradition of doing it. Finally, the authors advocate for distinct preparation for re-use targets (Macmahon et al, 2019).

Taking the entrepreneurial perspective, generic barriers and success factors for successful reuse of WEEE are presented by Kissling et al., (2013). They did a study of 28 cases consisting of both for-profit and non-profit operators of WEEE reuse in different forms. The 28 cases were located in Europe, Africa, Latin America, and North America. The scope on which they looked where information and communication technologies (ICT) and large household appliances. Most important barriers where difficulties in accessing sufficient volumes of good quality used equipment and the lack of legislation, which support, incentivize and if necessary, enforce this access were identified as the most impactful barriers. Success factors included the control and securing of product and process quality. This includes reliable access to quality items and the process related to preparing these items, including the destruction of user data.

Also taking the entrepreneurial perspective, Gelbmann & Hammerl (2015, p. 58) talk with a social enterprise doing preparation for reuse on a range of products in Austria. They find that for the success of a reuse business model, the following criteria need to be fulfilled. 1. Customers need to be willing to provide reusable items and they have to be willing to consume this product (and services). 2. Close collaboration between social enterprises, the waste

industry, designers, authority, and NGOs is essential. 3. It requires support from authority and NGO's Gelbmann & Hammerl (2015, p. 59).

To summarize, legislation and lack of incentives seem to be a key barrier both from the waste management perspective (Cole et al 2019; McMahon et al 2019) and from the perspective of entrepreneurs (Kissling et al 2013; Gelbmann and Hammerl 2015). Furthermore, only Gelbmann and Hammerl (2015) do not look solely at WEEE, indicating that this has been a focus area in preparation for reuse related research.

### **3.3.2 Waste Strategy in the European Union**

The purpose of this section is to give the reader insight into definitions and EU strategy that is relevant for the studied context. It is outside the scope of this thesis to give a scrutinized explanation of the relationship between European and Norwegian law. The following chapter, therefore, touches upon the major and most relevant European directives, with the remark that Norwegian waste companies adopt these (Haugedal and Syversen 2019).

#### **Definitions**

The terms that are of special interest to this thesis are reuse and preparation for reuse. In my thesis, I will rely on the definitions given by the European Union. Their definitions are widely used in the literature reviewed.

«Preparing for re-use' means checking, cleaning or repairing recovery operations, by which products or components of products that have become waste are prepared so that they can be re-used without any other pre-processing» (European Waste Directive 98, 2008, art 3. no 16).

Reuse refers to « any operation by which products or components that are not waste are used again for the same purpose for which they were conceived» (European waste directive 98, 2008, art 3 no. 13).

The two activities are separate and individual terms that should not be confused with each other (Johnson, McMahon and Fitzpatrick 2018). The difference is that preparation for reuse relates to items that have been defined as waste, and therefore needs to be "prepared". Contrastingly, reuse is simply using a good for the same purpose as it was made (European Waste Directive 98, 2008, art 3. no 16). In the latter, the product has not been waste in the meantime (Norwegian Environmental Agency 2020, p. 27). The activity of reusing could,



therefore, include online marketplaces for second-hand goods such as eBay or finn.no. This is outside the scope of this study.

This thesis aims to look into how substances or objects that have been classified as waste can be elevated into reusable objects or products. The term “preparation for reuse” is used in this thesis to describe the solutions and activities of giving discarded items a second life with a new consumer. When reuse is referred to in this thesis it refers to the reuse of discarded items.

## EU Waste Strategy

A central directive is Waste Directive 98 (European Directive, 2008, 98), which was adopted by Norway on the 1<sup>st</sup> of July 2011 (Norwegian government 2013). This directive includes the waste hierarchy which indicates what waste strategy is preferred. Thus, aiming mainly at waste management.

Before moving into this it should be noted that the waste hierarchy is a directive. Directives lay down certain results that must be achieved, but member states are allowed to freely translate this into their national law, as long as they reach the target (European Union, 2016).

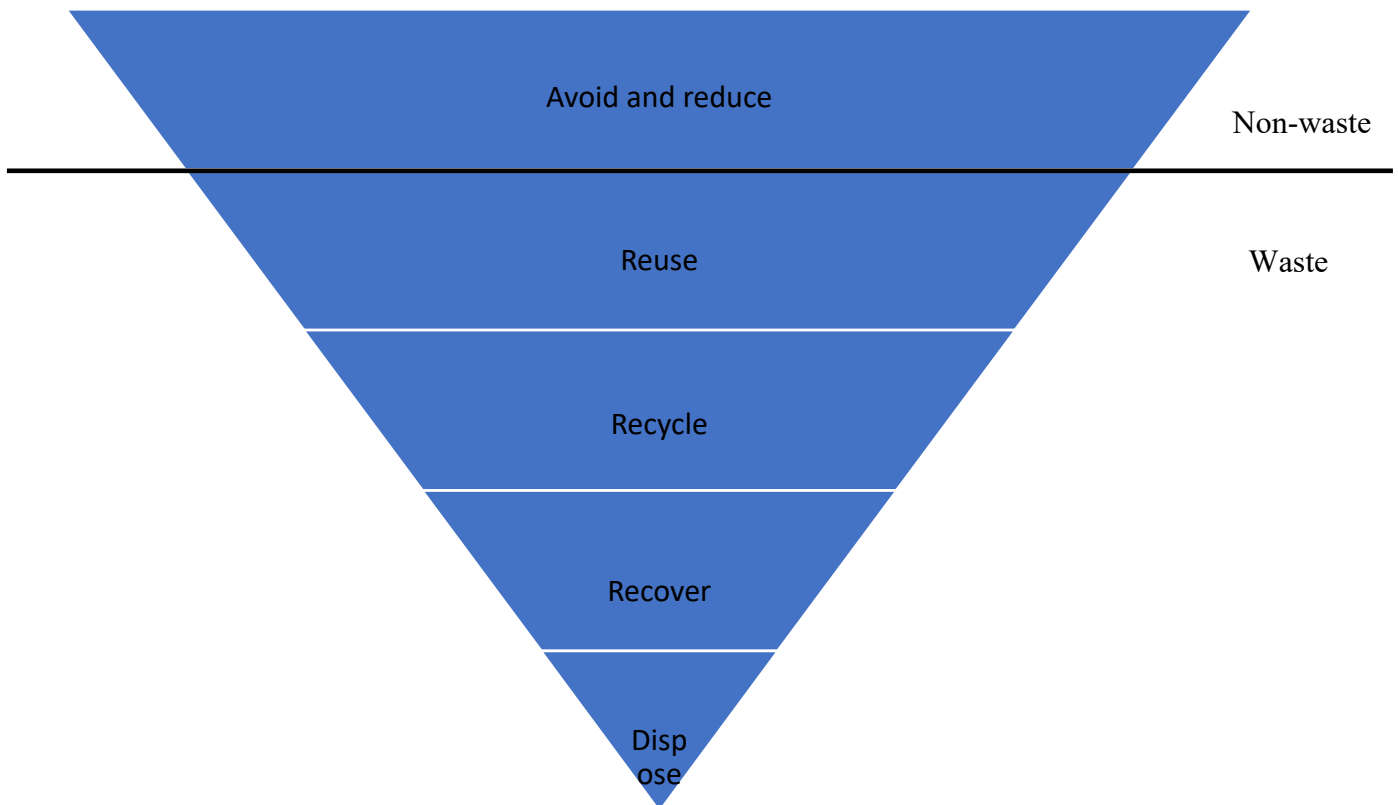


Figure 11: The waste hierarchy, by the European Union. Adopted from European Waste Directive, 2008, 98 and inspired by Cole et al (2019, p. 418).

The most preferable waste strategy is to avoid and reduce waste. This is followed by reuse (which involves preparation for reuse). Directive 98 also includes a goal of 65% recycling and preparation for reuse within 2035 (European Directive, 2008, 98). However, Norway will not implement preparation for reuse measures before 2020 (Haugedal and Syversen 2019).

Cole et al (2019) argue that there is a gap between what is wanted in this directive (Directive 98), and the incentives given from the EU with regards to preparation for reuse of e-waste in the UK. Among other things, Directive 98 also introduces the “polluter pays principle” and the “extended producer responsibility”. Relevant for this thesis is extended producer responsibility for electrical equipment, in which countries have the flexibility of developing their own regulations and operations (Kaza, Yao, Bhada-Tata and Van Woerden 2018, p. 155).

In addition to directives, the European Union has so-called action plans. These proposals can be considered non-binding contributions to the revision of existing EU-law as well as the development of new ones (European Union, 2019).

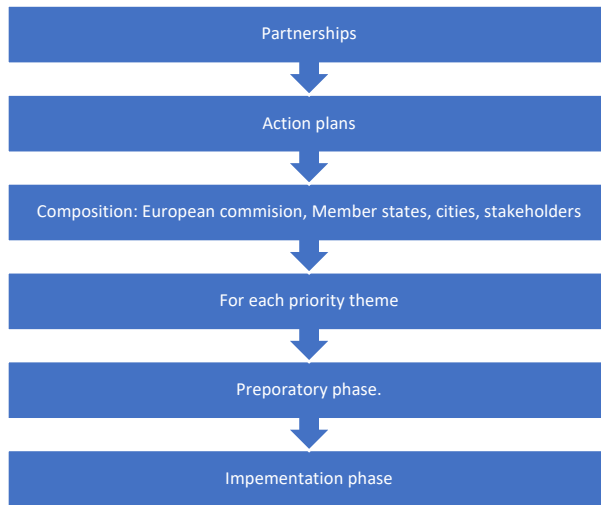


Figure 12: What is an action plan, by the European Union. Adopted from the European Union (2019)

The action plans give clear directions for future directives and legislation (implementation). One such action plan was developed in December 2015. As stated by (Hughes 2017, p. 14), this action plan “... seeks to establish a program of action, with measures covering the whole cycle: from production and consumption to waste management and the market for secondary raw materials”. Following this action plan, an amendment (EU, 2018) was given to the previously described European Directive (2008, 98).

In March 2020, the European Union launched a new such action plan, extending even further than the previous. The plan is called “A new circular economy action plan” (EU 2020). Given the action plan process (Figure 12), the actual directives and legislation following this plan are yet to be known. Nevertheless, the plan gives clear indications for member states to implement regulations and incentives to; “improve reusability, upgradability and reparability of products; enabling remanufacturing; introducing a ban on the destruction of unsold durable goods and incentivizing PSS systems or other models where producers keep ownership over product “(EU 2020, p. 4).

The focused product areas in the new plan are electronics, ICT, textiles, and furniture (EU 2020). Electronics and ICT will be a focus area for the consumer's “right to repair” (EU 2020, 7). Measures with regards to reuse will also be given to the textile industry. “... empowering business and private consumers to choose sustainable textiles and have easy access to reuse and repair services” (EU 2020, p. 10).

## 4. Methodology

In this chapter, an overview of the methodology is presented. The first section elaborates on the context of the study. Secondly, a presentation of the research strategy to answer the research question and objectives is given. Finally, a discussion is made about the quality, reliability and validity of the thesis.

### 4.1 Norwegian Waste Industry

The Norwegian waste industry is an interesting context for studying preparation for reuse. Norway is one of the richest countries in the world and the highest producer of electronic waste in the world (Balde et al 2015). Given the high living standards, it is expected that the quality of discarded items is higher than in other countries, as the quality and volume of the waste streams normally correlate with the income level of that country (Kaza et al 2018, p. 17).

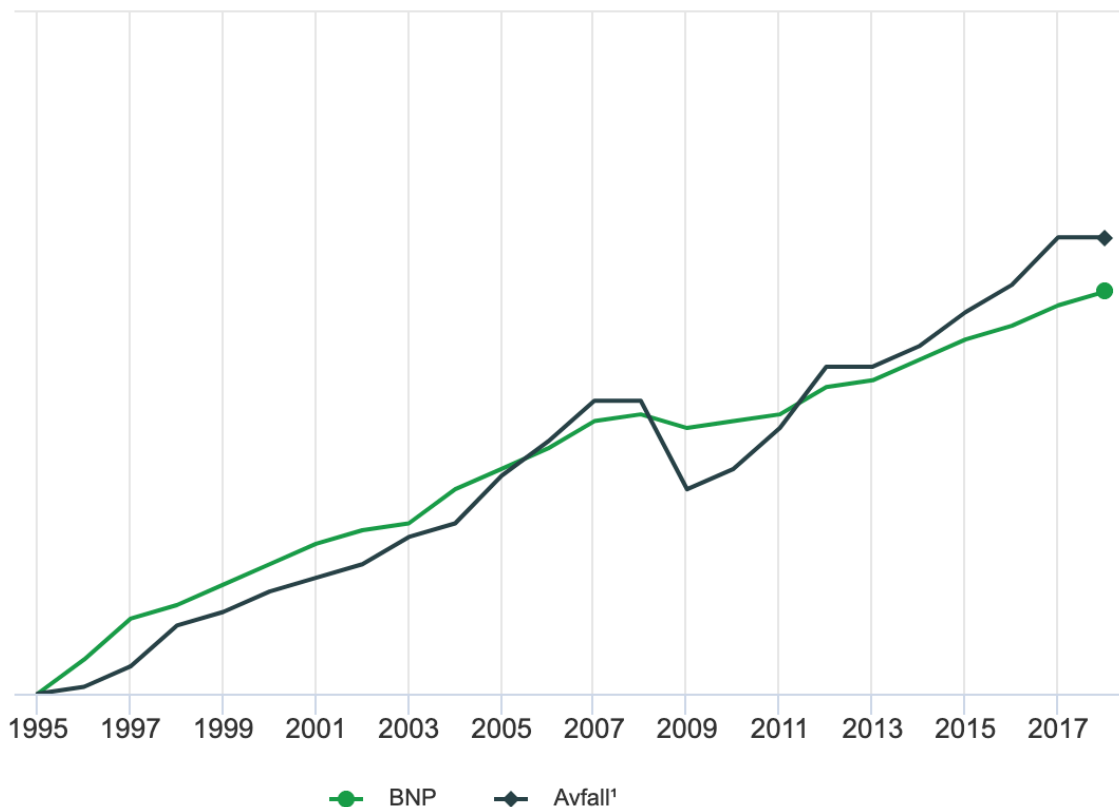


Figure 13: Development of GDP and total waste in Norway, by Statistics Norway

As can be seen in figure 13, the total amount of waste in Norway is starting to decrease but is still above national GDP. Furthermore, 40% of Norwegian waste was materially recycled and 33% energy recovered in 2017. This constitutes an overall recycling rate of 73% in Norway (Statistics Norway, 2020), making Norway number eight in Europe with regards to recycling degree (Eurostat 2020).

A main principle in Norwegian waste policy is that the municipalities are in charge of handling household waste, while the handling of industrial waste happens on the free market (Norwegian Environmental Agency 2020, p. 9). Of the total amount of waste in Norway 21% comes from household waste and the rest is from different forms of industrial waste (Statistics Norway 2020).

The Norwegian “Forurensningsloven” is the guiding framework for Norwegian municipalities with regards to both household and industrial waste. The costs for renovation are covered by a waste fee, and there is no room for profiting on this fee in the context of household waste (Norwegian environmental agency 2020, p. 10).

While the municipalities need to follow this regulation, they are free to decide how they organize the collection of waste. In 2016, there were 71 inter-municipal companies covering 94% of the municipalities. Although there has been a slight change since 2016 (Norwegian environmental agency 2020, p. 10), this indicates that this is the dominant form of organization.

In general, household waste takes two routes before being processed by the waste company. One route is through the everyday delivery of household waste. This garbage is picked up by the recycling stations, normally by a garbage truck. Another route is when the customers deliver waste to the recycling station. This often includes heavier objects such as sofas, refrigerators, and so on. These are delivered by the customers.

This thesis looks at the second route to waste, where the customers deliver waste to a recycling station. The argument for looking at this context is that the items in the second route are normally “crushed” and recycled, giving little potential for reuse. Since the solutions in this thesis are based on these recycling stations, and because these stations take both private and

industrial waste (Norwegian Environmental Agency 2020, p. 10), this thesis looks at household and industrial waste.

Finally, the studied context is not limited to any specific product category. It consists of all kinds of reusable products coming to the recycling stations, ranging from bicycles to refrigerators. No product limitation is chosen because of coherence with the explorative research aim.

## 4.2 Research Design

A research design should lay out the overall plan of the research project. As mentioned in the introduction, my interest has been on understanding mainly two questions. 1. What is the economic value of Norwegian discarded items? And 2; how can these items be given a second life. The remainder of this section aims at showing how these questions are answered in this thesis, taking a mixed method, explorative and case study-inspired approach.

### 4.2.1 Mixed Methods

“Mixed methods research is the branch of multiple methods research that combines the use of quantitative and qualitative data collection techniques and analytical procedures” (Saunders, Lewis and Adrian 2012, p. 169-173). These research designs can be either subsequential or concurrent (single-phase). A concurrent (single-phase) triangulation design uses both qualitative and quantitative approaches simultaneously in data collection and analysis. An advantage with such a design is that triangulation makes the findings more ascertain (Saunders et al 2012, p. 169- 173).

Concurrent triangulation is used in chapter five. This chapter aims to infer whether there exist unexploited reusable items in Norwegian waste streams. This is done by asking all informants whether they think it does. This is compared to and nuanced using international quantitative research on the functionality of WEE. Finally, one observation with pictures at Haraldrud serves as a method for visually observing the reusability of discarded items. It was planned to go through an e-waste cage and testing functionality. Because of the Covid-19 outbreak this spring, this was not sound. International research doing such analysis is therefore presented instead.

Chapter 6 addresses how reusable items can be utilized. This builds on international waste management research regarding barriers and success factors for reaching a higher reuse degree, presented in chapter 3.3.1. This is compared to the informant's responses. Here, the author's subjective and logical interpretation of what appears to be the most critical barriers and success factors is presented.

A discussion about the combination of qualitative and quantitative data in this thesis will be further elaborated in section 4.3. This thesis is fundamentally about discarded reusable items and how these can be utilized. In this sense- it leans more towards a quantitative and objective approach than a qualitative and interpretive approach. Nevertheless, it is acknowledged that different individuals have different interpretations of reality and that informants at recycling stations have first-hand knowledge about both the potential and processes in place. Moreover, it argues that getting a correct picture of the values and processes is only achieved through a combination of quantitative and qualitative data collection techniques and analytical procedures (Saunders, Lewis and Adrian 2012, p. 169-173). This thesis's pragmatic use of quantitative and qualitative data analytical procedures will be further discussed when talking about research philosophy in 3.3.1.

## **4.2.2 Explorative Approach**

An exploratory study is valuable when you want to discover what is happening and gain insight into a topic of interest (Saunders et al 2012, p. 174). It is important to be open to changes during the project. Finally, you might risk not finding out anything new (Saunders et al 2012, p. 174).

The reason for taking an explorative approach is that very little research exists on the phenomenon of discarded items. To my knowledge, no research exists on this in a Norwegian context. Furthermore, the circular economy is also at an early stage (Murray, Skene, and Haynes 2017).

## **4.2.3 Inspired by Case Study**

This study is inspired by case study design. A central aspect in Robert K. Yin (2011) is the use of rivalry explanations to theoretical propositions. This is valuable because it allows the author to reflect and be critical to his presuppositions about reality. Also, it is important that

the reader understands the authors presupposition(s) so that the reader can understand what has been in focus throughout the thesis, and how it has changed.

At the start of the research process, the main theoretical proposition was that there exist values in Norwegian waste streams in the form of reusable discarded products and that these were unexploited. Chapters 5, 6, and 7 will show the nuances in this main proposition which partly turned out to be wrong and partly turned out to be right.

This study does not follow the exact scrutiny which is described by Yin (2011). First, a multiple case study design of the different preparation for reuse solutions is not possible because preparation for reuse is not currently measured officially (Sølvi and Syvertsen, 2019). Therefore, a comparison between the different preparation for reuse solutions is difficult.

A single case study design of for example Haraldrud recycling station, being a typical case, could have been done. As will be shown in chapter 6, the focus will be on Oslo Renovation Agency. I have chosen to present also the three other recycling stations to give the thesis more depth.

## 4.3 Data Collection and Analysis

Data collection and analysis in qualitative analysis are highly interconnected and start already when interviewing informants (Saunders et al 2016, p. 571). This section first elaborates on the three main sources of data that are used in this thesis. Thereafter, it presents the informants and how the analysis of the subsequent interviews are done.

### 4.3.1 Data Collection

One of the advantages of a case study and qualitative research is the possibility of using multiple sources of evidence (Saunders et al 2016; Johannessen, Tufte, and Christoffersen 2011). The data collection that answers the research question, aims, and objectives are interviews with informants, one observation and secondary resources.

As for the informants, “open” semi-structured interviews were used. Semi-structured interviews are non-standardized and well suited for exploratory research (Saunders et al 2016, p. 393). The word “open” semi-structured interview is used the interviews were characterized by being open. According to Saunders et al (2016, p. 175), this is normal in



exploratory research. In fact, in exploratory research, unstructured interviews are more used than semi-structured interviews (Saunders et al 2016, p. 391). I will discuss the qualitative analytical procedures related to the semi structured interviews in more detail in section 4.3.3.

One formal observation was made at the Haraldrud recycling center. The observation consisted of a walk-through of the recycling stations, with the reuse director at Oslo Renovation Agency. The observation aimed to get a deeper insight into the processes related to how preparation for reuse works in practice, as well as the reusability potential of the waste. Immediately after the interview, a long summary was written. The summary included sensory impressions such as smell, sound and visual inspections. It also included a summary of facts steaming from a conversation with employers with a social entrepreneur, as well as a conversation with one of the staff members. Pictures from this observation will be used later in this thesis. An unformal observation was also done at Bergen intercommunal recycling company (BIR). Unformal meaning that no pictures were taken because no permission could be granted at the time and place of visit.

Finally, this thesis uses a rich array of secondary resources to answer the research questions. In total, more than sixty scientific articles related to preparation for reuse, reuse, and waste management were summarized using abstract and title, helping to get an understanding of what was known and what was not. After seven days of literature review, ten articles were found relevant for the research aim and objectives. These were read multiple times to ensure that the research purpose was in line with this thesis. Some but not all of the articles referenced in this thesis were added to the thesis. Most of the articles were published in the “Waste Management” journal. Some were also published in “The Journal of Cleaner Production” and some in “Resource and Management”.

### **4.3.2 Informants**

Most of the informants were executives at recycling stations. These were chosen to aid in the different research objectives. As the research journey developed, it turned out that the preparation for reuse solutions are highly dependent on other actors than the recycling stations. Following a holistic viewpoint (Ingebrigtsen and Jakobsen 2007), one social entrepreneur (Moradi), and producer responsibility actor NORSIRK is interviewed. Finally, one sales executive responsible for reuse in Komplet and one EE-waste handler (Recac) was interviewed. All of the informants were either executives or in the executive group. A short

presentation will be made of the informants, before explaining why these were chosen. The five first are the recycling stations followed by actors that somehow facilitate the preparation for reuse in Norway.

## Per

Per is the head of projects and development at the private department in Bergen Intercommunal Recycling company (BIR). With his tremendous interest and knowledge about the circular economy in the waste context, he can provide rich information about Norwegian actors that prepare items for reuse. Per had an especial interest in incentivizing and legality issues regarding preparation for reuse and recycling in general. Per can be described as the “expert” with his deep knowledge base about the Norwegian Waste industry and especially circular economy.

## Gitte

Gitte work as a reuse coordinator at Oslo Renovation Agency. During her time here, she has contributed to the appointment of re-use ambassadors for each of the different recycling stations in the Oslo Region. Gitte is knowledgeable on different aspects related to preparation for reuse, focusing on the processes that are present at Oslo Renovation Agency, an especially Haraldrud Reuse Station. Gitte can be described as the “enthusiast” with her passion for reuse.

## Tone

Tone also works at Oslo Renovation Agency and is responsible for customer insight and digital user experience. In the interview, we talk about the challenges of reaching a higher degree of re-usage. Tone would like me to write about how they can increase the “outtake” of reusable wastes, meaning that she wants customer insights into the users “buying” the discarded goods. She is also very interested in overall waste prevention strategies. Tone could be described as the “commercialist” with here emphasis of changing the context in which reuse takes place.

## Monica

Monica is the general manager of Iris Service AS. The company is responsible for the collection of waste and the operation of 12 recycling stations in the region Salten. Salten is located in the northern part of Norway and consists of 9 municipalities. Monica has had this position for one year and is a former entrepreneur.

## Maria

Maria is the concept developer at the newly developed Resirkula in Hamar. Resirkula is a modern facility where a shopping center is placed at the recycling station. She believes that a higher reuse degree can be achieved through commercializing reuse. This is done by taking inspiration from the Swedish Company, Retuna. She believes in heightening preparation for reuse by changing and commercializing the context in which preparation for reuse takes place. Maria could be described as the “optimist” because she wants to transform the way preparation for reuse is traditionally done at Norwegian recycling stations.

## Åse

Åse is one of the founders of Mora di, a company established in 2015. Mora di is a social entrepreneur who among other things focuses on renovation and repair of bicycles. The company was established because the founders wanted to help people who otherwise find it difficult to get out into the labor market. She follows up by saying that Mora di also wanted to help save the environment by contributing to finding treasures in the waste stream. Åse could simply be described as “the social entrepreneur”.

## Guro

Guro is the communication director at Norsirk. Norsirk is a nationwide producer responsibility company for electrical and electronic products, batteries and packaging. They collect, reuse and recycle waste according to their customer’s producer responsibility. Guro’s key message is that preparation for reuse needs to be profitable if it is to have an environmental impact. Guro strikes me as being busy and knowledgeable. Guro could be described as “realist” since she sees the economic profitability as central for achieving a higher preparation for reuse degree.

## Ole

Ole is responsible for environment, quality and deals in the Komplet Group. Komplet is an e-commerce company selling electronic and electrical equipment. The Komplet Group is headquartered in Norway and has nine webshops in Norway, Sweden and Denmark. Ole is highly aware and engaged in the preparation for reuse activities in Komplet. Ole could be described as “ the retailer”, being the only retailer representative in this paper.

## Anders

Anders is the CEO of Revac. Revac is one of the biggest handlers of EE-waste in Norway, and they are privately own. Anders could be described as “ the E-waste expert” being the only e-waste representative in this paper.

## Why the persons were chosen

In line with the explorative nature of this thesis, the informants include four recycling stations. This was chosen to give a broad and rich understanding of different preparation for reuse solutions in Norway. This is important for being able to open up a research field on preparation for reuse, and to be able to say something about which processes are in place today.

The informants also consist of one social entrepreneur, one producer responsibility actor, one EE- retailer and one EE-recycler. These informants were chosen because they are a part of the preparation for reuse processes.

### **4.3.3 Analysis of the Interviews**

The analysis and discussion have been highly flexible and iterative between theory, literature review, coding and discussion. As a consequence of the exploratory research, conceptualization was used to see what the data indicated in light of the research purpose and objectives.

Shortly after the interviews, 15-30 minutes were used to write a summary, describing the content and subjective impressions of the informants. This was followed by transcription of the interviews, and a subsequent summary of the informant. Furthermore, a reflexive diary (Saunders et al 2019, p. 575-589) was used throughout the entire process as a tool for noting

down ideas, thoughts, criticism and other aspects related to the research. These tools were very helpful as a means to remember and clarify my thoughts.

As a result of the explorative design, informants were allowed to speak very freely, leaning towards an unstructured interview. This was done because I did not want to force my prepositions on to the informants. However, these semi-structured interviews were relatively “open” made comparison and analysis especially challenging.

Therefore, multiple rounds reading, coding, and recoding the interviews were done. The coding was done in practice by making comments in a word file and eventually comparing the emerging codes using Excel. After a long period of iterating between the informants, theory and literature, conceptualization and links became gradually clearer and clearer. Excel was then used as a final means of comparing different responses to the same subject.

After each interview, a summary was written. These summaries focused on my overall impression of the informants as an individual, and their main perspective. My overall impression of the informants included subjective impressions such as their behavior and if they were insecure or stressed. Secondly, the summary focused on the informant’s main perspective. For example, one informant argued very strongly that the economic potential in preparation for reuse was the key determining factor for its sustainability. Another informant talked a lot about the lack of incentivizing. An extensive summary was also written shortly after my observation, including facts and sensory experiences such as sounds, smells, and visual impressions.

## 4.4 Evaluation of the Research

Overall, evaluation criteria are used to access “how do I know”? (Saunders et al 2016, p. 201). Here a split often occurs between positivists and interpretivism in how they evaluate the quality of their research (Saunders et al 2016, p. 201). Because of this thesis's pragmatic philosophy, and because it both might be useful (Saunders et al 2016, p. 202), both will be described. Before discussing the reliability, validity and quality of this thesis, it is useful to elaborate on how these are viewed.

### **4.4.1 Philosophy**

Research philosophy refers to a set of beliefs and assumptions about the development of knowledge (Saunders et al 2016). Positivism, critical realism, interpretivism, post-modernism, and pragmatism are given as examples. Pragmatism strives to reconcile the different philosophies by arguing that different approaches are better in different contexts (Saunders et al 2016, p. 137-143).

This thesis uses mixed methods and takes a pragmatic approach. Chapter five in this thesis uses mainly a positivist approach and chapter six uses mainly an interpretivist approach. Chapter five asks what the economic value is and is based on the exact same questions to all informants across cases, earlier quantitative research and cross-case comparison. Chapter six is much more phenomenological, subjective and interpretive. Here, the focus is understanding what the informants see as the main drivers and barriers for achieving a higher preparation for reuse degree. In other words, this section studies the informant's perception of drivers and barriers for achieving a higher reuse degree, as it appears to them in their real-life context. Because of this thesis's pragmatic and dual approach, the remainder of this section builds on both the positivist and interpretive approaches.

### **4.4.2 Reliability**

In the positivist approach, reliability refers to whether the research can be replicated so that the results could be re-tested (Johannessen, Tufte, and Christoffersen 2011, p. 229). The logic is that another researcher should be able to follow your research design and replicate your results.

This thesis uses international quantitative research which is easily accessible for the reader. Furthermore, the names of the informants are stated and explained. Moreover, this thesis is transparent about the motivation for the study and changes that took place during the journey. This leads us over to the interpretivism approach.

Dependability is representing reliability in the interpretive approach. (Saunders et al 2016, p. 206). Dependability is about being transparent about the changes in focus that took place during the research, such that the reader can evaluate and understand it (Saunders et al 2016, p. 206).

It has been shown earlier that my initial theoretical proposition (Yin, 2011) was that there exist unexploited economic potential in Norwegian waste streams. The background section also elaborated on my motivation for starting a business. Chapters 5, 6, and 7 will show how this theoretical proposition was partly wrong and partly right. Furthermore, it will show that the focus has expanded from only looking at the economic value to also include social and environmental values.

This focus and presupposition have consequences for the reliability of this thesis. The subtitle of this thesis is “a waste stream treasure hunt”. This indicates that my focus in this thesis, at least chapter 5, has been to find treasures in the form of reusable products, in the waste stream. Although I have tried my best to look for rivalry explanations, this underlying personal motivation may very well have influenced the results of this thesis, especially in chapter 5.

Finally, in chapter 6, key success factors and barriers will be discussed. First of all, this takes primarily the perspective of waste managers- for example executives at the recycling stations. The reason for this is that most of my informants are executives. Furthermore, because of my highly explorative approach and open-ended interviews, this part rests on my interpretation and therefore subjective and logical assessments.

### **4.4.3 Validity**

Validity refers to whether you are measuring what you want to measure (Johannessen, Tufte, and Christoffersen 2011, p. 230). If reliability is off validity is off.

Chapter 5 uses reusability for measuring whether there exist unexploited values in the Norwegian waste streams or not. As will be shown, the measuring of reusability is tricky because it depends on the subjective assessment of the accessor. As stated by Zacho et al (2018), what is waste for someone may be a valuable item for others.

Building on EMF (2013), it is separated between technical and biodegradable products. For technical products such as WEEE, functionality is seen as the best indication of reusability. For non-technical items, such as sofa and furniture, visual inspection is needed. Finally, the functionality test for technical products also includes the need to visualize the items.

Chapter 5 therefore combines visual inspection and functionality assessment at an observation Haraldrud. To increase transparency and address the subjective aspect of reusability, this is coupled with pictures, giving the reader a chance to access reusability himself.

Finally, in both chapter 5 and chapter 6, international research is used and generalized to a Norwegian context. This was done because of the lack of research in a Norwegian situation. However, there are likely to be situational factors in the respective countries making such comparisons difficult. Chapters five and six therefore elaborate on the context's and points out where there are differences that are likely to influence the generalizability to the Norwegian context.

The interpretive response to internal validity is credibility. In short, it means that the representation of the research participants is as the participants intended (Guba and Lincoln 1994) As stated by Saunders et al (2016), building rapport with informants, discussing results with different persons and checking data with participants are ways of strengthening the credibility.

Being just one person, this has been a challenge. I constantly asked myself questions like: What does the informant really mean here? Could I have misunderstood the context in which they answered? Did they misunderstand my question? I have also tried to be as open as possible in the interviews. It was important for me to hear the challenges from their perspective and their context.

One aspect that has helped the credibility is that I sent a copy of the finished thesis to each informant. This has allowed them to correct their statements and my interpretation of these statements in any given context. This approach may be called communicative validation (Knut Ims, 1987).

## Summary

The reliability and validity in this thesis most be seen in relation to the aim of opening up a new research field. As a consequence, it takes a broad and explorative approach and discusses elements related to both reliability and validity throughout the thesis and as a part of the discussion.



#### **4.4.4 Ethical Guidelines and Privacy Protection**

Ethicality and privacy protection have been important during the entire process. This has been balanced between consideration of the informants on the one hand, and the quality of the thesis on the other hand. One example of this is when informants talked badly about the practices of other informants. This issue has been dealt with in the way that all informants got to read all their citations.

Furthermore, if I felt that I have asked a question where the informants were unsure if they could answer (let's say because of loyalty to the employer) I told them that "you do not need to answer this if you do not want to". This happened on some occasions.

Before the start of every interview, I read the informant's rights following the Norwegian center for research data (NSD). This included the right to not answer, the right to alter and look through the analyzed material. Finally, I made an effort to make a simple and easy to understand information sheet (see appendix 2) in which every participant signed digitally or by writing.

Using the informant's name has had consequences. Findings, where one informant talked badly of for example the practices of other informants, have not been included. As a note, the reason for using the first name as opposed to the last is to keep this thesis from appearing on google if/when searches are made on the informant's name.

## **5. Values- Results and Discussion**

This chapter answers subquestion one, whether there are unexploited reusable items in Norwegian waste streams. Section 5.1 presents the empirical results for answering to which degree there exists such unexploited values in Norwegian waste streams. Building on these results, section 5.2 discusses how these reusable items can be seen as an indication for economic, social and environmental value.

In the methodology chapter, it was explained that the reusability of a discarded item is dependent on who accesses it (Zacho et al 2018). Reusability in this thesis is measured using functionality testing and subjective visual inspection. Reusability is presented in 5.1.

Furthermore, it was explained that the understanding of value has broadened during the research project, and that reusability can be seen as instrumental for creating economic, social and environmental value. These values will be defined and discussed in 5.2.

### **5.1 Results**

This section presents evidence indicating that reusable products are being thrown away in Norway. This is done by triangulating between qualitative interviews, one observation and quantitative research on functionality.

#### **5.1.1 Observation at Haraldrud**

When observing Haraldrud, pictures were taken of the different reuse corners. This gives the possibility to visually inspect the reusability of discarded technical and biodegradable items. The pictures were taken in February 2020.

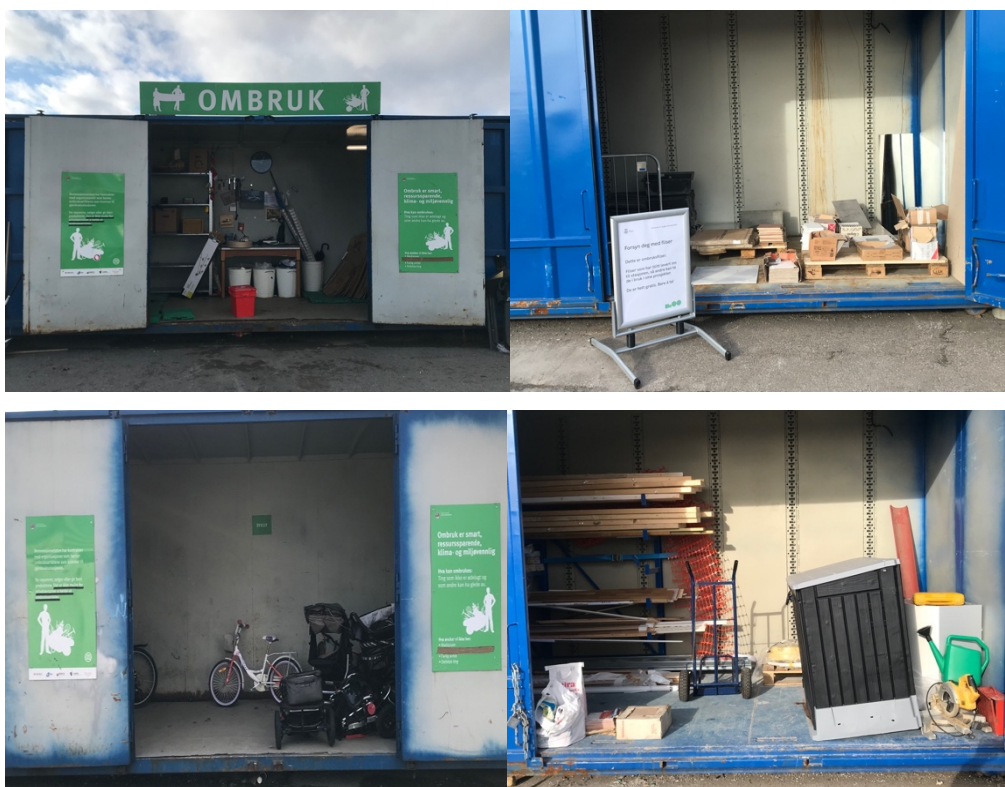


Figure 14: Reuse corners at Oslo Renovation Agency. Used with approval.

Starting from the picture in the bottom left, one bicycle and two strollers can be seen. When assessing these items, they seemed to be either in good shape or needing some small repair such as changing the tire. The picture on the bottom right shows a big box that is difficult to label. This was in good condition. When talking to a staff member while doing my observation, two customers asked him, within in a time period of five minutes, if they could take this box. The staff member said multiple customers have asked him this, indicating the reusability of this item. Looking at the rest of the pictures indicates the usability of the products that are placed in the reuse corners at Oslo Renovation Agency. Looking at the picture in the middle

to the left you can see a watch, and umbrella and three garbage cans. In the middle to the right you can see tiles. On the pictures on top, you can see white goods and seemingly fine furniture.

It should be mentioned that the items put in these sheds are put there either because the customers think it should be reused, or because the staff members think so. In fact, each of these reuse sheds has a sign explicitly telling the customers to not put non-reusable items in the shed. Although some customers do this (Gitte), the fact that the items are put in the shed therefore indicate that they are reusable.

At Oslo renovation Agency, ten social entrepreneurs and two entrepreneurs gather the items depicted in Figure 14. This actors and the term social entrepreneur will be presented and defined in chapter 6.1.1. According to Gitte, most of the things that these entrepreneurs collect are directly reusable, and not in need of repair. These items are simply checked and superficially cleaned before being sold (Gitte).

While this section has presented discarded items that are being utilized at Oslo Renovation Agency, the following sections will describe and argue that the pictures may be seen as an indication for the unexploited value at other recycling stations that do not have an equally well developed collaborative system as Oslo Renovation Agency. The preparation for reuse processes is different on other Norwegian recycling stations (Monica, Gitte, Per, Maria). That leads us over to unexploited reusability.

### **5.1.2 Unexploited Reusability**

This section aims at indicating that there are reusable items in Norwegian waste streams that are not utilized. Unexploited reusability is defined as functional or reusable items that are sent to incineration or crushed instead of being prepared for reuse. This relates to my main and initial motivation for writing this thesis.

All of my informants were asked whether they believe there exist such unexploited values in the waste stream in the form of reusable discarded items. Their response can be seen in table 4.

| Informant                              | Answer:   |
|--|---|
| Bergen intercommunal Recycling company | There is a huge potential. I would say enormous.  |
| Oslo Renovation Agency                 | Yeah. Both because people instead choose to throw stuff because they think that “no one else wants this. also... people disagree on what constitutes reuse. |
| Norsirk                                | There exists a lot. There is no doubt.  |
| Iris                                   | Yes, a lot.   |
| Sirkula                                | Yes, I think it does.   |
| Komplett                               | Definitely.   |
| Revac                                  | I think there are functionable items in the EE-waste stream, yes.   |

Table 4: Informants response to whether there exist unexploited values in the waste stream

The remainder of this section focuses on WEEE. The reason for this is that WEE is a focus area both in the literature and in the empirical investigation. Figure 15 is taken at Oslo Renovation Agency. It shows discarded small electrical equipment, that is transported and sent to Revac for recycling. When asked about the potential in these items, Anders at Revac says



Figure 15: Picture taken of E-waste cage at Oslo Renovation Agency. Used with permission

that there would be interesting to do a waste stream analysis of the functionality in these items and that he is sure that some of these articles are working. Anders also says that none of these items are being prepared for reuse today. He elaborates that revac does not want to enter the reuse business. However, they do some component reuse. Component reuse is reuse of for example processors. Furthermore, Anders questions whether anyone would buy the discarded items, and stresses that while some of it might work, most of it will not.

Following are different international articles that aim at quantifying the reusability degree of such cages that are seen in figure 15. All these authors use visual and technical inspection to assess the functionality of the items. All authors also state the percentage that can be directly

reused, but differ somehow on what “needs subsequent assessment”. A summary of these quantifications is given in table 5.

|                            | Directly reusable | Need of subsequent assessment | Not reusable | Country | Authors and date   |
|----------------------------|-------------------|-------------------------------|--------------|---------|--|
| <b>Reusability of WEEE</b> | 22%               | 18%                           | 60%          | Denmark | Parajulu and Wenzel (2017)                                   |
|                            | 13-16%            | -                             | -            | Germany | Messmann, Boldoczki, Thorenz and Tuma (2019)                 |
|                            | 2.1%              | 67.7%                         | 30.2%        | Spain   | Bovea, Ibáñez-Forés, Pérez-Belis and Quemades-Beltrán (2016) |
|                            | 28%               | -                             | -            | Ireland | Coughlan and Fitzpatrick (2020)                              |

Table 5: Waste management research on the unexploited reusability, mainly on EE-waste streams

The average in column 2 is 16.65%, indicating that a large fraction of WEEE streams are functional. It is interesting to note then that Revac does not have an official system for reuse, and that only 1% of the Norwegian WEEE stream is prepared for reuse (Norwegian Environmental Agency 2020, p. 53). To access the generalizability to a Norwegian context, the remainder of this section describes the methodology and contexts of the different studies described in table 5.

Parajulu & Wenzel (2017) look at “the potential for a circular economy in household WEEE”. Based in Odense, Denmark, they collected more than four tons of WEEE from eight different

recycling centers. The authors look only at what they call “small appliances” and “monitors”. The study aimed to characterize the products and to assess both the reuse and the recycling value (Parajulu & Wenzel 2017, p. 273).

Parajulu & Wenzel (2017) find a significant potential for revenue generation both in terms of recycling and reuse. They find that 22% of the “small appliances” and 7% of the “monitors” are fully functioning. Based on the price of similar products on different secondhand markets, the authors suggest a resale value of up to 247 euros per cage, which is similar in size to the one sent to Revac, depicted in figure 15.

Bovea et al., (2016) contribute to the literature by providing a framework for how to access and estimate the potential of small waste electric and electronic equipment (sWEEE) and by applying the proposed method. Applying the method on 87.7 kg of household waste in Spain, they found that 2,1% could be returned for direct re-usage, 67.7% needed additional subsequent evaluation or repair and only 30.2% have no potential for reuse.

A similar study is also done in a German setting by Messmann et al (2019). Following the same research design as Bovea et al (2016), they first propose a methodology for quantifying the potential reusable waste, before applying this methodology in the German State of Bavaria. In opposition to Bovea et al (2016), Messmann et al (2019) look at the potential in WEEE, used furniture and used leisure goods. They find that between 13% and 16% of the waste stream could immediately be prepared for re-use. Moreover, an additional 13%-29% could be retrieved if changes were made in the collection, retrieving and storage of these items. Interestingly, the authors find that 84% of the damage caused to WEEE is attributed to a lack of weatherproof roofing (Messman et al 2019).

Finally, by creating public collection events at different workplaces in Ireland, Coughlan & Fitzpatrick (2020) manage to collect 283 kg of laptops, tablets and smartphones. This is done by ensuring secure deletion of personal information. Of the collected items 28% was suitable for reuse and sent to preparation for reuse organizations. It is assumed in this thesis that the collected items were considered waste by the owner, and that the usability (28%) therefore falls under the waste definition (European waste directive 98, 2008, art 3 no. 13), which is the scope of this thesis.



### 5.1.3 Summary and Discussion

This section aimed to indicate whether reusable items are likely to exist in the Norwegian waste streams. This was done by presenting pictures from Haraldrud recycling station, presenting earlier research on the degrees of the functionality of WEEE streams, and by the respondent answer to the question; “Do you think there exists unexploited reusable items in the waste streams”?

The pictures taken at Haraldrud indicates that many reusable items are being thrown away. While the exact pictures taken are being utilized at Haraldrud- such a process is not present at other Norwegian recycling stations. The pictures from Haraldrud could therefore be seen as an indication of unexploited reusability at other recycling stations. It should be noted that Haraldrud is the biggest recycling station in Norway in terms of tons of waste to the stations (Gitte). It is therefore likely that the number of reusable items is high on this station compared to other Norwegian stations. However, the municipality surrounding Haraldrud is not characterized by a high living standard, compared to other Norwegian recycling stations. It might therefore be that other recycling stations in other municipalities have a higher waste stream quality.

The average number of WEEE that could be directly reused, based on table 5, is 16.65%. In Norway, less than 1% of the total collected WEEE was prepared for reuse (Norwegian environmental Agency 2020, p. 53). Although these statistics might be wrong due to lack of good statistics of the EE-waste streams (Norwegian Environmental Agency 2020, p. 53) it gives a strong indication that there exists functional(reusable) electrical equipment in Norwegian waste streams. Assuming that the reported number to the European Union of 1% reusability is correct, and comparing this to the average in table 5- it indicates that 15.65% of Norwegian waste streams are suitable for direct reuse and therefore representing an unexploited value in terms of functionality. When Anders in Revac is confronted with these numbers, he says that there probably are functional items in Norwegian EE-waste streams, which is not utilized. Therefore, unexploited reusable items in Norway is expected to be high.

The literature review done on the functionality and reusability of WEEE indicates that an amount of this waste is in fact being thrown away in other European countries- representing an unexploited value potential. The contexts are very different than at the Norwegian

recycling stations. However, since the quality and size of the waste streams seem to follow the income level of that country (Kaza et al, 2018), the unexploited values must be assumed to be even higher in Norway.

All in all, it seems likely that reusable items end up in Norwegian waste streams. The exact size and characteristics of these items' value are likely to be dependent on the recycling stations' solutions for preparing for reuse, as well as the income level in the specific county and country (Kaza et al 2018).

## 5.2 Discussion

This section discusses how reusability can be seen as an indication for economic, social and environmental value. Environmental value is defined loosely by building on the Ellen Mac Arthur Foundation (2013, p. 30) as greenhouse gas emissions, water usage and toxicity. Social value, not well defined in the literature, is defined here as job creation and social well being. Economic value is defined as the sum of the cost and the profit.

### 5.2.1 Economic Value

The sections above discussing reusability can be seen as an indication of economic potential. A more comprehensive view, looking also at the costs is necessary to get a complete picture of the economic opportunities.

Norwegian newspaper articles indicate that the economic potential of reusing discarded items is very high, looking at it from the perspective of reuse shops. This includes titles such as: «There is an almost unstoppable need for secondhand stores» (Ove Eikje 2020). “Secondhand stores are raising their profit” (Anne Kari Løberg, 2019), “Secondhand store sells for millions” (Tone Aftret, 2017) and “Profiting millions on selling used products” (Terje Andresen, 2014). However, these are newspaper sources that are not subject to the scrutiny required in academic research.

Nevertheless, a similar approach to measuring the profitability from the “reuse shop” perspective is done by Zacho et al (2018). The case studied in Denmark had an annual turnover of approximately 1 million euros. The thesis concludes however, that the logistics cost is so high that the company does not earn a lot of money. In fact, running the reuse station in Denmark requires 9 fully paid contractors and 6 workers on special conditions.

“You need to do a lot of manual work (disassembly and cleaning). This has a high cost. In Norway, with the wages here. If a professional process industry should have done the work, it would have been too expensive” (Guro).

The quote above describes the same finding as has been shown in the studies conducted in for example Denmark. Even though there exists a lot of value in the waste stream, preparing these items for reuse involves a lot of work (Zacho et al 2018). Interestingly, it seems also that the labors on special condition actually enables the reuse on such stations- because they are cheaper than industrial workers.

Consistent with previously described literature from other countries, unutilized items in the waste stream seems to exist. The economic potential from the entrepreneurs’ and recycling station's point of view, however, seems to be moderate. This is because “It is a lot of logistics behind it” (Gitte).

## **5.2.2 Social and Environmental Value**

While this thesis initially wanted to explore the economic potential, the perspective of value has changed throughout the thesis. The exploited and unexploited reusability values are about much more than economic profit. Reusable items in the waste stream enable social inclusion for people outside the labor market. This seems to be mediated by social entrepreneurs. This kind of value is congruent with the value as described, especially by Ingebrigtsen and Jakobsen (2007). This holistic value can be said to include the triple bottom line, people, planet and profit. This section discusses how these values are interconnected, starting with the social value.

As can will be shown in table 6, most of the entrepreneurs that prepare items for reuse include some form of social aspect. By looking at their websites, it can be seen that this is often related to social labor inclusion. This is likely to have an enormous mental and spiritual value for the individuals that are provided a job. This extends the limits of value - congruent with the triple bottom line, including people and not limited to profit.

Very interestingly, this social labor inclusion is also what enables the utilization of otherwise unexploited reusable items. Because the wages in Norway are so high, utilizing some of the reusability in discarded items would not be possible were it not for the cheap labor force provided by disadvantaged people. As stated by Guro; “You need to do a lot of manual work

(disassembly and cleaning). This has a high cost. In Norway, with the wages here. If a professional process industry should have done the work, it would have been too expensive”.

This collaboration between social entrepreneurs and disadvantaged people is again what enables the environmental potential. Because, as stated by Gitte: “ Reuse is not environmentally beneficial if it does not happen”.

Nevertheless, the social and environmental value is dependent on the reusability of the discarded items, enabling social entrepreneurs and the environment to benefit. Therefore, section 5.2.1 discussing economic value is still useful as it can enable better utilization of reusable discarded items. This leads us over to subquestion number 2, how to utilize these items.

## 6. Processes- Results and Discussion

This chapter addresses how reusable discarded items and the unexploited values they represent can be utilized. Section 6.1 presents the results of my data collection with regards to Norwegian preparation for reuse solutions in place today. These are then discussed against the literature review on success factors and barriers for reaching a higher reuse degree presented in the frame of reference in section 3.3.1.

### 6.1 Results

This section presents the result of my data collection with regards to which preparation for reuse processes are in place in Norway today. It starts by describing the four solutions at the recycling stations. This is followed by Norsirk, Moradi, Komplett and Revac as actors that somehow facilitate preparation for reuse solutions. All information in this section that is not referenced is based on interviews with the informants.

#### 6.1.1 The Four Recycling Stations

In this section and throughout the text, the focus will be on Oslo Renovation Agency as the “main case”. The reason for this is that Oslo Renovation Agency appears as both the most typical and the most extreme case. It is typical in the way it is designed, and extreme in terms of having a high preparation for reuse degree. Therefore, most of the data collected are also based on Oslo Renovation Agency. It is therefore natural to start with this station.

##### *Oslo Renovation Agency*

Oslo Renovation Agency (ORA) is the interdisciplinary recycling station in Oslo. They are responsible for gathering and handling household waste in this region, but also handle some industrial waste on commission. As one of the few recycling stations measuring reuse, ORA had a reuse extent of 0.82 in 2018 (Gitte). Furthermore, my interpretation is that they have a high focus on reuse. This is underpinned by the fact that they, as one of few recycling stations, have chosen to call their recycling stations for reuse stations as opposed to recycling stations.

Oslo Renovation Agency has multiple arenas where people can deliver and take out reusable items. More precisely, they have five big recycling stations, two mobile reuse stations and nine mini reuse stations. When describing the preparation for reuse process, the focus will be

on Haraldrud which is one of the five big recycling stations. Pictures of Haraldrud were shown in chapter 5, figure 14, when we discussed the reusability of the items at this station.

At Haraldrud, people can deliver reusable waste for free but cannot take reusable items out of the reuse corners. The reusable items that are put in the reuse corners are stored and picked up by twelve different (social) entrepreneurs. These (social) entrepreneurs consist of actors picking up bicycles, clothes, refrigerators and so on. They arrive once a week, and they fix, refurbish and repair, or simply resell the reusable items directly (Gitte). The twelve actors are shown in table 6.

| Actors name          | Social entrepreneur or social enterprise | Product type                       | Website   |
|----------------------|--|------------------------------------|---|
| Fretex               | Yes                                      | Clothing and textiles              | <a href="https://www.fretex.no/om-fretex">https://www.fretex.no/om-fretex</a>   |
| Uff                  | Yes                                      | Clothing and textiles              | <a href="https://uffnorge.org/">https://uffnorge.org/</a>   |
| Marita foundation    | Yes                                      | Books, Furniture, Clothes and more | <a href="https://marita.no/hvordan-bidra/gi-ting">https://marita.no/hvordan-bidra/gi-ting</a>   |
| Oslo Colleague       | Yes                                      | Bicycles. Electrical equipment     | <a href="https://oslokollega.no/varer-tjenester">https://oslokollega.no/varer-tjenester</a>   |
| Norwegian reuse      | No                                       | White goods                        | <a href="https://norskombruk.com/pages/om-oss">https://norskombruk.com/pages/om-oss</a>   |
| Useful Labour        | Yes                                      | All kinds                          | <a href="https://www.oslo.kommune.no/helse-og-omsorg/rusomsorg/nyttig-arbeid-1/nyttig-butikk/">https://www.oslo.kommune.no/helse-og-omsorg/rusomsorg/nyttig-arbeid-1/nyttig-butikk/</a>   |
| Scouts reuse         | Yes                                      | All kinds                          | <a href="https://www.facebook.com/speiderensgjenbruk/?fbclid=IwAR1rmvsDoEnuxjBMMTBu2WY1hHArFsAYRaTf63JQX7kv8tBqn5mDK8Wpao">https://www.facebook.com/speiderensgjenbruk/?fbclid=IwAR1rmvsDoEnuxjBMMTBu2WY1hHArFsAYRaTf63JQX7kv8tBqn5mDK8Wpao</a> |
| The work             | Yes                                      | All kinds                          | <a href="https://frelsesarmeen.no/rusomsorg/jobben">https://frelsesarmeen.no/rusomsorg/jobben</a>   |
| Circular ways        | Yes                                      | Furniture redesign                 | <a href="https://vollebekkfabrikker.no/blog/circular-ways">https://vollebekkfabrikker.no/blog/circular-ways</a>   |
| Frigo                | Yes                                      | All kinds                          | <a href="http://www.frigo.no/">http://www.frigo.no/</a>   |
| Norwegian Microhouse | No                                       | Wood                               | <a href="https://norskemikrohus.no/">https://norskemikrohus.no/</a>   |
| The rainbow          | Yes                                      | All items except sofa's            | <a href="https://www.oslo.kommune.no/avfall-og-gjenvinning/alle-gjenbruksstasjoner/regnbuen-gjenbrukskjeller/#gref">https://www.oslo.kommune.no/avfall-og-gjenvinning/alle-gjenbruksstasjoner/regnbuen-gjenbrukskjeller/#gref</a>               |

Table 6: Social entrepreneurs gathering items from Oslo Renovation agency, Source: Gitte

Social entrepreneurs can be defined as individuals that utilize discarded resources, create new services and products and transform the institutions they are in charge of ( Leadbeater 1997, p. 53). Thus, a social entrepreneur is the “person” behind a social enterprise. The social enterprise being; «any business venture created for a social purpose—mitigating/reducing a social problem or a market failure—and to generate social value while operating with the financial discipline, innovation and determination of a private sector business» (Kim Alter 2007, p. 12).

This thesis defines social entrepreneurs and social enterprises’ as people and businesses that have social goals, and treat them as at least equally important as economic growth. Table 6 builds on this definition and is based on a list provided by Gitte, as well as a systematic inspection of the companies website. Based on this simple and superficial assessment, it was concluded that 10 out of 12 can be defined as social entrepreneurs. For simplicity, the remainder of this thesis will not separate between social entrepreneurs and social enterprises.

### *BIR*

BIR private is responsible for collecting and gathering household waste in Bergen and surrounding municipalities. All the recycling stations at BIR have a reuse station (Yearly rapport, 2019). In contrast to REN, the reuse process at BIR is more standardized. On each recycling station, customers can put reusable items in a shed. Also in opposition to ORA, the customers have to pay for delivering reusable items, but the customers can take out reuse for free. When visiting one such hall in Bergen, I was given a card that explained this solution. The justification, as stated on the card, was that if it was free to deliver to the station, customers would take unusable stuff and put it in the reuse station. Bir also has a reuse car, similar to Oslo Renovation Agency.

### *IRIS*

IRIS handle household and industrial waste in Salten and its nine municipalities. They have twelve different recycling stations. “Some are big and open every day while some are small and open a couple of days of the week. But all of them are staffed” (Monica).

IRIS has one reuse container at one of their recycling stations. They also have a Facebook activity called “junk findings”. This is an activity where the recycling center gives away discarded reusable items. With a positive tone, they spread awareness and contribute to enhancing the extent of reuse by sharing and giving out reusable items that are collected from the reuse container. Thus the top of the waste hierarchy, avoid waste.

### *Sirkula recycling station*

Resirkula is a new circular park in Hamar that was supposed to start in April 2020. It is a modern facility that consists of a recycling station and a shopping mall. Their inspiration is taken from the Swedish company, “Eskiltuna Energy and Environment” which also are behind the opening of the shopping mall which is called Retuna.

From the customer perspective, delivering waste is like with any typical Norwegian recycling station. You drive your car and can choose between different fractions ranging from tree, metal, E-waste and more.

Regarding preparation for reuse, the solution is very innovative and different. At the same location as the recycling station is a shopping mall where five different entrepreneurs have their own shops. A staffed reception gathers the items that can be reused, and redistribute these to the five entrepreneurs, based on their “wish list”. The entrepreneurs then fix, refurbish and repair these items in their shop.

### **6.1.2 Actors Contributing to Preparing Items for Reuse**

This section presents some of the actors contributing to preparation for reuse. Their views and solutions are presented to be able to give a better picture of how preparation for reuse solutions are carried out in Norway, especially in relation to Oslo Renovation Agency. An introduction will be made about the company, followed by how they contribute to preparation for reuse.

#### *Norsirk*

Norsirk is an actor ensuring the producer's responsibility. Owned by firms, they make sure that packaging and e-waste from the respective businesses are handled under producer responsibility standards. They “provide knowledge and services for companies that are taking a producer responsibility” (Guro).

Norsirk “drives around the country and collect, mostly from Norwegian recycling stations but also from the retailers. Because these are the two places that have an obligation to receive WEEE for free from the residents”(Guro). Norsirk has agreements with recycling companies that ensure depollution, recycling and recovery of these items. Besides, they have reuse agreements with social entrepreneurs, for example on refrigerators. Dependent on brand and quality, some white goods are sent to a social entrepreneur that refurbish, repair and manage



the sales of these items. This assessment is done by the employees working at the recycling stations or the retailer. “They are trained to know which products to put aside” (Guro).

### *Moradi*

Moradi is a social entrepreneur that repairs and redistribute bicycles. They are located in Oslo and started their business in 2015. Moradi employs people that for different reasons are unable to enter the job market.

Moradi has different business operations. They gather used bicycles from cooperatives, repair them and sell them to students. They also rent themselves out to firms. At the firm’s location, Moradi repairs their bicycles while the employees work.

Moradi also picks up bicycles from Oslo Renovation Agency, although they don’t have an official agreement (Åse, Gitte). These items are sold primarily to students, although they are planning to sell also to a wider group.

### *Komplett*

Komplett is an actor that normally sells electronic equipment. They have their HQ in Sandefjord, Norway, but also operate in Sweden and Denmark. Discarded items that are delivered to Komplett are either sold by Komplett themselves or delivered to Revac. Revac is a national recycling company that recycles e-waste. By giving the items to Recac, Komplett connects with Norsirk through their producer responsibility. In fact, Norsirk is the one responsible for connecting Revac and Komplett.

### *Revac*

Revac is one of the biggest actors in Norway ensuring the de-pollution and recycling of e-waste. Revac does not have a solution dedicated to preparation for reuse, but they do some component reuse. This means that they reuse some of the components in E-waste. For example the processors in mobile-phones (Anders).

## 6.2 Discussion

The aim of this section is to discuss how to reach a higher reuse degree. Since Oslo Renovation Agency is the only one reporting on their reuse degree, a comparison of how well the different solutions at different recycling stations function is not possible. This section therefore compares the different solutions based on the success factors and barriers as stated in table 3, and argues why Oslo Renovation Agency can be seen as best practice. After discussing best practice in light of the earlier research, two barriers and one critical success factor emerge as key for enhancing the reuse degree in the Norwegian waste industry.

### 6.2.1 Best Practice

If looking solely at the entrepreneur perspective, a key success factor is getting access to high-quality items (McMahon et al 2019, Kissling et al 2013, Cole et al 2019). This is dependent on the recycling behavior of the customers at the recycling stations. As stated by Gitte, some people might throw away items that work fine because they think that “No one else wants this item”. It is also dependent on a good and close collaboration between the recycling stations and the social entrepreneurs so that the social entrepreneurs access the reusable items as close to the end-user as possible. On the flip side, involving social entrepreneurs seems to be critical for an enhanced reuse degree from the waste management perspective. This is also mentioned by Cole et al (2019).

A key barrier for the entrepreneur further seems to be having access and control over the processes and securing products as close to the end-user as possible (McMahon et al 2019, Kissling et al 2013). Getting access as close to the customer as possible is in accordance with the first principle of circular economy value capture, circling as close to the customer as possible (Emf 2013, p 30). For the case of preparation for reuse, getting access as close to the customer as possible is important because items may be destroyed. For example, Messmann et al (2019) found that 84% of the damage caused to WEEE was due to lack of weatherproof roofing. As can be seen in figure 14, white goods are stored outside at Oslo Renovation Agency. Furthermore, being as close to the end customer as possible is important because of the environmental and economic cost of transport, logistics and storage.

As shown in Table 6, Oslo Renovation Agency has an agreement with twelve social entrepreneurs. These are allowed to gather suitable items scheduled at different times of the week. Furthermore, preparation for reuse is a focus at Oslo Renovation Agency. In fact, Oslo Renovation Agency has chosen to call their recycling station for a “reuse station”- making it clear for the customers that they should not throw away reusable items- because someone else might want it.

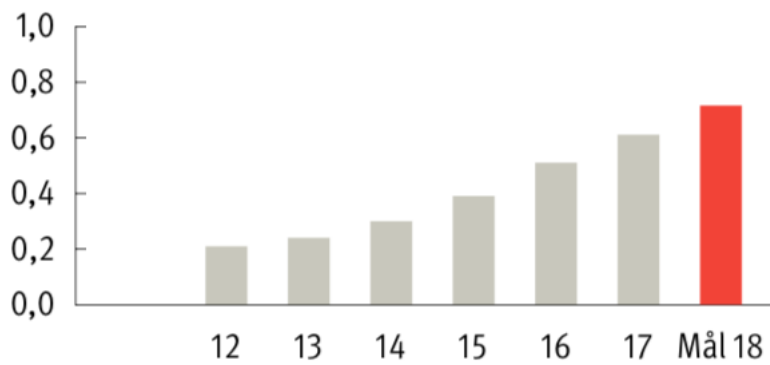


*Figure 16: Picture from Haraldrud. Used with permission*

The sign to the right of figure 16 says that “Reuse is smart, resource-efficient and environmentally friendly”. It further says that items that are not broken can be put in this reuse corner. Similar signs are placed in each of the nine reuse corners at Haraldrud. Some of these reuse corners and their signs where shown in Figure 14 when we looked at the reusability of different items at this station.

When a person visits Haraldrud to discard items, they are guided by staff members. These staff members are trained and ask customers questions about the reusability of their items- minimizing the numbers of reusable items that are thrown away because the customer thinks that no one else would want it. In 2019, 1800 tons were prepared for reuse at Oslo Renovation Agency (Gitte). As can be seen in figure 17 below, Oslo Renovation Agency has steadily increased its preparation for reuse degree, providing twelve social entrepreneurs

with good quality items suitable for reuse, stored under weatherproof roofing.



*Figure 17: Preparation for reuse development at Oslo Renovation Agency. Gathered from Oslo Renovation Agency Yearly rapport (2019, p. 6)*

Other recycling stations in Norway have different processes for preparation for reuse. At BIR, customers pay to deliver reusable items. As stated on a card at their reuse shed in Bergen, the logic for this is that when it is free of charge, customers tend to deliver non-reusable items to avoid the waste fee, which causes additional work for the company resulting in associated costs for the customers through the waste fee. Customers putting non-reusable items to be reused is a problem for Oslo Renovation Agency because of the resources needed to clean it up (Gitte, Tone).

However, BIR, in opposition to Oslo Renovation Agency, allows customers to take out the items that are put in the reuse “shed” for free. Oslo Renovation Agency does not because, as stated by Gitte, they would then have a problem with people waiting at the station for quality items. At Haraldrud- which is a car-based solution, having a lot of people on a busy station filled with cars poses a health risk. The visited recycling station at Bir, however, was a lot smaller than Haraldrud- indicating that this risk is smaller here.

Taking both the waste management and the entrepreneurial perspective on how to achieve a higher reuse extent, McMahon et al (2019) conclude that the key success factors for extending the preparation for reuse degree are involving social entrepreneurs and providing them with access as close to the end customer as possible. The only interviewed recycling station that uses social entrepreneurs, to my knowledge, is Oslo Renovation Agency.

## 6.2.2 Barriers

Two barriers for enhancing the reuse degree became very clear when doing my analysis. These can be summarized into customers and legislation and incentives. This analysis mainly focuses on the recycling stations' point of view, because most of the informants were executives at recycling stations.

When looking at reuse from the recycling stations' point of view, represented by the interviewed informants, a key barrier is getting rid of reusable items, and not having reusable items and up at the recycling station (Gitte, Tone), leading us first to the customers as a barrier.

### *Customers*

When asked about reuse's potential for a greener world, Gitte replies; "I think that one has to change the consumer behavior". That one has to have a market for the reusable items. Similarly, when asked the same questions, Guro replies: "Dependent upon the market. If we have markets it is big. If we don't have a market the value is zero."

As noted by Gelbmann & Hammerl (2015, p. 58), customers are a key barrier for enhancing the reuse degree of items. These customers take two critical roles (Gelbmann and Hammerl 2015; Gitte). First, they are the ones that deliver the reusable items to recycling stations. Second, they are the buyers of such items.

Customer as a deliver is highly related to recycling behavior. According to Gitte, the customer does two types of errors. First, some customers put non-usable items in the reuse corner that they think are reusable but are not. Secondly, some customers do not put reusable items in the reuse corner because they think that no one else wants it (Gitte). While the first delivery error is a problem for the recycling stations, the main problem for enhancing the reuse degree is related to the customer that throw away reusable items.

At Oslo Renovation agency a sign is placed at each reuse corner telling the customer to not put broken items in the reuse shed. However, the problem stated by Gitte indicates either that these customers do not see this sign, or that they simply ignore it. While an explanatory explanation of the customer's behavior is outside of the scope of this thesis, the SHIFT framework (White 2019) offers guidance on how to make customers make greener choices. This could be used for further investigation of this problem.

The second role that the customer take is the role of taking out reuse (Customer as a buyer). One of the main challenges for Oslo Renovation Agency is that they do not get rid of reusable items. Tone speculates that the context in which the outtake of reuse happens would influence the number of items sold. Normally, the context where the exchange of discarded items takes place in Norway is at the recycling stations- which is often both smelly and noisy. Tone also speculates whether pricing might influence the outtake- that it might be seen as more attractive when it is not free.

An ongoing real-life experiment addressing some of these aspects is Resirkula reuse shop, moving the place of exchange inside a modern shopping facility. Maria explains that the goal of their newly developed station is not to sell items at cheap as possible- since the quality of the items is often very high.

One question that arises is who the customers are. Tone hypothesizes that the customers at their reuse tent are 1. Students, 2. Poor people, 3. Environmentalists, 4. Treasure hunters. A study done by Gregson, Crang, Laws, Fleetwood and Holmes (2013) on a car boot sale in the UK shows that participants actually are not doing reuse because of the sustainable aspect. Instead, the informants report on doing this activity because it allows them to hang out with the family. Some report that they often do not even use the bought items. In fact, Gregson et al (2013) argue that car boot sales enable more, not less, consumption. More research should be done on who the customers at different recycling stations really are. This is important because the different strategies for enabling green consumer behavior are dependent on who the consumers are (White et al 2019).

### *Lack of Proper Legislation and Incentives*

This section elaborates on one legislative barrier that appears as key for the waste managers and one barrier that appears as key for social entrepreneurs. These two barriers were chosen because they appeared as very central for enhancing the reuse degree.

Based on the findings in Cole et al (2019) informants were asked whether they believe there exists a mismatch between the incentives given by the European Union and their strategy. Most of the informants seemed unaware of this gap. The simple reason might be that Norwegian rules adapt to European directives and strategy, as described in 2.5.2. As stated by Per; “. In Norway, it is «forurensingsloven» that is the basis».

As the only informant acknowledging this gap, Per says; “To put it on the tip. The less waste reduction and the less reuse you have, the better your conditions for a material recycling degree”. In a rapport about better waste statistics, Haugedal and Syversen (2019, p. 34) acknowledge that not measuring reuse may, “in the worst-case scenario” lead to favoring material recycling degree over reuse. As stated by Per; “It is not waste when it is reuse and repair. Then it is not in our statistics. So again. Should we use a lot of time on reuse when it is not a part of our key performance indicators?”.

All though some actors present their reuse degree in Norway (Oslo Renovation Agency 2019, p.6), reuse is not a part of the official waste statistic (Haugedal and Syversen 2019, p. 31). In light of the EU’s goal of 65% preparation for reuse and recycling, the report argues that a systematic reporting of reuse should be in place by 2020.

Many authors argue for distinct preparation for reuse goals (McMahon et al, 2019; Kjørboe et al 2015; Cole et al 2019; Gelbmann and Hammerl 2015; Kissling 2013). Today, this is only the case in Spain (Cole et al 2019, p. 425; McMahon et al, 2019).

Finally, from the social entrepreneur perspective, a gap between reuse and incentives is related to taxes. In a Norwegian setting, the fact that redistributors have to pay taxes is a barrier that does not exist for example in Sweden. “We have to pay taxes on the used items we are selling... Thus we need to pay taxes 2 times on a product... In Sweden, they do not have this legislation “ (Maria). Similarly, when asked about what she considers the main barrier for achieving the circular economy Åse replies: “We have to pay taxes when preparing bicycles”.

### **6.2.3 Critical Success Factors**

Based on the iteration between theory, research and empirical evidence, this thesis proposes two critical success factors for enhancing the reuse degree at Norwegian recycling stations.

#### *Collaboration*

The collected data indicate the need for collaboration. This reveals itself in the data as subtle statements from each actor, regarding the hopelessness of trying to achieve a circular economy within the current state of the world. Gitte at Ren says they need customers that are willing to buy or use the reusable items and that they need agreements with entrepreneurs that allow them to “connect” with the customers that want the usable items. Guro, representing the producers, says that they need clear incentives from the government if they are to do more to

achieve a circular economy. Moradi, a social entrepreneur, says that they need the government to take away the taxes on repairing secondhand goods, and that they lack access to quality products.

This indicates the need for collaboration across industry, customers and government. Therefore, this study supports the Circulation Economics theory in the sense that there is a need for a holistic viewpoint if we are to achieve a circular economy. The interplay between different actors seems to be a key criterion for reaching a circular economy. Collaboration is stated as key factors in reaching a circular economy (EMF 2013, Ingebrigtsen and Jakobsen 2007; Jørgensen and Pedersen 2018b, 122). Collaboration has also been mentioned in waste management by Gelbmann & Hammerl (2015, p. 58) and Macmahon et al (2019). This seems to hold also in the Norwegian waste context and preparation for reuse.

### *Involving Social Entrepreneurs*

A part of the success factor seems to be attributed to the use of social entrepreneurs. As stated by Guro; “You need to do a lot of manual work (disassembly and cleaning). This has a high cost. In Norway, with the wages here. If a professional process industry should have done the work, it would have been too expensive”. As indicated implicitly in this statement- social entrepreneurs are crucial for effective preparation for reuse solutions because they enable low-cost labor in a time-consuming work of disassembly and cleaning of products. This enables preparation for reuse in places where it would otherwise be economically unsustainable.

From the entrepreneur perspective, access to quality products is seen as the main barrier (Cole et al 2019; Macmahon 2019; Kissling 2013). From the waste management perspective, that a main problem is that many reusable items are not attractive enough for the customers.

Overall, this finding is in accordance with the previously described communicative arena in which Jakobsen and Ingebrigtsen (2007) advocated for a communicative arena where people talk openly and collaboratively. Having such an arena could help actors such as the recycling station to “get rid of” reusable and discarded items. Moreover, it seems that collaboration between social entrepreneurs and the recycling stations is key for reaching the customer. One reason for this might be that the context where the exchange takes place is moved away from the recycling station. Moreover, collaboration enables the recycling stations to get rid of their reusable items. Since they are not specialized in sales, and because this is not their community mission, it is better to give the sales role to a social entrepreneur.



## 7. Theoretical Discussion

The two theoretical contributions that were introduced in the theory chapter were Circulation Economics and the Circular Economy. It was noted that most circular economy theory focuses on the economic value for businesses, while sustainability theory is more broad and adaptive, aligning culture, nature and economy. This section aims at taking a mental leap into the two normative solutions, and comparing how well they would solve the practical preparation for reuse issues at Oslo Renovation Agency. This is followed by a discussion on whether social goals should be more explicit and horizontally (Geissdorfer et al 2017) incorporated into circular economic theory.

### 7.1 Within a Circular Economy

In the theoretical reference frame (section 3.1), I presented a continuum ranging from Adam Smith to degrowth. The circular economy was placed to the left and defined as an economy that focuses primarily on the economic gains for the businesses involved, and the environmental side effects (Geissdorfer et al 2017).

The unexploited values, that are both demanded and exists, could be utilized, within this framework, through a collaboration between the recycling stations and social entrepreneurs. The main issue here is the practicality of the logistics of coupling the items with the consumer. This was elaborated in chapter six.

Still, many functional items would go to waste. As stated by Gitte, it is hard to get rid of things with a small commercial value, but utility value. The circular economic theory opens up for sustainable business models. In section 2.1.3 we introduced three different business models, slowing, narrowing and closing resource loops. Especially relevant is the business models which slow down resource loops for technical nutrients, “designing long-life products” and “designing for product life extension” (Bocken et al 2016, p. 309). Such models would have a huge effect on the preparation for reuse degree- making the products easier to disassemble and reuse. It might also happen that they would keep the products away from the recycling stations- which is also the goal of the recycling station (Gitte, Tone).

## 7.2 Circulation Economics– Preparation for Reuse as a Miniature Example of a New Economy

Circulation Economics was defined as having much of the properties that were identified in the sustainability literature by Geissdorfer et al (2017), and it was placed to the right in the spectrum presented in the reference frame. It is interpreted as having a more fundamental and holistic view on how to create a new economy. While it is outside of the scope of this thesis to discuss a new economy, we can try to look at preparation for reuse solutions at Haraldrud as a miniature example of such an economy.

If doing so, we can see that preparation for reuse solutions exhibit many of the dimensions that are described by Ingebrigtsen and Jakobsen (2007). The interconnectedness between social entrepreneurs, the environment and the economy reveals itself in the empirical data. For example, Åse explained how she started her business because she wanted to help disadvantaged people into the labor market. At the same time, she wanted to contribute to the environment.

While only interviewing one such actor, table 6 showed that there exist many more such social entrepreneurs. Indeed, these actors are measuring “more than just money”(Ingebrigtsen and Jakobsen 2007) by the fact that they voluntarily endorse in the activity of starting a company to contribute to people and planet. These actors, and the culture they display, enable what resembles a miniature example of an economy as depicted by Ingebrigtsen and Jakobsen (2007).

## 7.3 Should Social Goals be Included in Circular Economy Theory?

In the theory section, sustainability theory was seen by Geissdorfer (2017) as more diffuse and holistic compared to the circular economy which was more focused on economic and environmental gain. One of the aspects that contributes to “blurring” the sustainability concept can be said to be the inclusion and interconnectedness between social, environmental and economic goals. Said in another way, treating the triple bottom line, people, profit, and planet as equally important.

However, social labor inclusion seems to be key for a well functioning preparation for the reuse system. Thus, it seems that social labor inclusion, while good in itself, also is what renders preparation for reuse possible because of the cheap labor force provided.

On the other side, it can be argued that the clearness in the goals of circular economy as a way of making a profit makes companies more positive to this solution (Geissdorfer et al 2017). A good thing about the circular economy, as opposed to sustainability, is therefore that companies are more likely to implement a circular economic theory. If the social aspect were included in the circular economy, it might blur the concept, making it less attractive for business operators, thereby limiting actual implementation.

Nevertheless, in the context of preparation for reuse, social inclusion seems to be key for its success. This is in line with sustainability authors such as Ingebrigtsen and Jakobsen (2007). This thesis therefore advocates the holistic view of including social goals, in the context of preparation for reuse.

As a concluding remark to this chapter, my view is that the two solutions offer complementary contributions to the highly necessary but still normative new economy.

## 8. Conclusion

At the start of this thesis, it was shown a picture of discarded but seemingly reusable furniture. It was asked why a system for redistributing these items did not exist. This thesis has shown two different theories describing alternative economies in which this furniture would have not been destroyed, or maybe not even ended up at the recycling station. Furthermore, this thesis has shown some real-life solutions where these items are distributed again.

Chapter 5 addressed whether there are likely to exist unexploited economic potential in Norwegian waste streams. Here, a separation between economic value seen as profit and costs, unexploited reusability and exploited reusability were described. Regarding unexploited reusability, it was shown that international waste stream analysis on average shows that 16.65% of EE-waste streams are functional. Compared to Norway, only one 1% of the Norwegian EE-waste stream is prepared for reuse, indicating that 15.65% of EE-waste streams are functional but not exploited. This unexploited reusability can be seen as an indication of economic value. However, the economic value includes costs, which seem to be high for all product categories. Finally, the unexploited reusability could and should be utilized to enable social labor inclusion value creation and environmental value creation.

Chapter 6 addressed how to achieve a higher preparation for reuse degrees. Drawing on international research compared with empirical data, it identified success factors and barriers for enhancing the reuse degree and thereby exploiting unexploited reusable items identified in chapter 5. Combining waste management and the social entrepreneurs' perspective, it was concluded that two main barriers for enhancing reuse degree were 1. Customers delivering and taking out reusable items and 2. Lack of proper legislation and incentives. For social entrepreneurs, the need to pay taxes are inhibitory for enhancing the preparation for reuse degree. For waste managers, preparation for reuse goals is especially important. Key success factors seem to be collaboration across industries and with the government. Collaboration with social entrepreneurs is highlighted from the waste management perspective as especially important because these allow for the utilization of the functional, not utilized items.

Chapter 7 took a mental leap into circulation economics and circular economy and discussed how these could aid in the development of a higher preparation degree and how the practical findings fit with this theory. It was noted that the two normative theories offer complementary

and highly necessary theoretical contributions. It was also noted that the identified social entrepreneurs exhibit some of the cultural elements as described by Ingebrigtsen and Jakobsen (2007). Thus, preparation for reuse social entrepreneurs can be viewed as a “miniature example” of the new economy as described by circulation economics (Ingebrigtsen and Jakobsen 2007). Regarding the circular economy (Emf 2013), especially the business models which slow down technical resource loops would be a huge potential for enabling a higher reuse degree- or diminishing the need for it.

## 9. Implications

This thesis has practical as well as theoretical implications. The theoretical implications are related to the conflicting theories presented throughout this thesis. Chapter 5 gives practical ideas to entrepreneurs and to waste managers wanting to utilize the unexploited values.

Chapter 6 has practical implications for waste managers.

Theoretically, both the circular economy and sustainability aims at creating a new, alternative economy to the existing linear take-make-waste model. Most circular economy theory focuses on the economic gain for businesses and the environmental gains for society, without including social goals explicitly (Geissdorfer et al 2017). This is contrasted with sustainability, which sees the social aspect as equally important when creating a new economy.

This study shows that social entrepreneurs are crucial for preparation for reuse solutions. As stated by Guro, “In Norway, with the wages here it would have been too expensive to employ industrial workers”. On the flip side, this enables these individuals with labor inclusion.

This has theoretical implications for the circular economy. It indicates that the social aspect of preparation for reuse in creating a circular economy includes, and is highly dependent on understanding the interconnectedness between economy, nature and culture (Ingebrigtsen and Jakobsen 2007). Without stating that the circular economy should include social aspects, this study has shown that the interconnectedness and horizontal goal setting between people, profit and planet enables a higher preparation for reuse degree.

For waste managers, involving social entrepreneurs seems to be critical. Furthermore, waste managers could also consider other types of relationships. The key seems to be the coupling of the products they have with the consumer who wants it. Waste managers seem not to be the best-suited actors for doing this. Therefore, collaboration enables changing the setting where discarded items are sold, away from the often smelly and chaotic recycling stations to a more cozy context more applicable for making a sale. For social entrepreneurs, this thesis has shown that it is very likely to exist unexploited values in the waste stream. These potentials should be utilized to enable economic, social, and environmental gains.

## 10. Future Research

One of the aims of this thesis was to open up for a theoretical discussion about preparation for reuse and suggesting areas for further research. First, chapter 5 indicated that functional EE-products are very likely to exist in the Norwegian EE-waste stream. A waste stream analysis, quantifying how many functional items end up in Norwegian waste streams would be very interesting to perform. This research could build on the methodologies described in section 5.1.2, checking the functionality of EE-waste streams.

Chapter 6 discussed success factors and barriers for the utilization of these items. It concluded that there exists very little knowledge about the customers buying discarded items. It has been hypothesized that they consist of; 1. Students, 2. Poor people, 3. Environmentalists, 4. Treasure hunters. This should be further investigated so that effective market strategies can be developed and aimed at these consumers. These market campaigns can build on the findings in White et al (2019). Similarly, research should be done on the antecedents underlying green consumer behavior in the context of buying discarded items. This is highly related to identifying the customers and their motivation.

For reaching the aim of obtaining a circular economy, sustainable business models should continue to be a focus area for further research. This thesis has shown some of the difficulties of creating a circular economy in a world dominated by producers having linear business models. The problem is that it is simply not possible to create a circular economy as defined in this thesis without the help of businesses.

In the fall of 2019, a Norwegian documentary called “ Garbage smugglers” (my translation) showed how many reusable WEEE are sent from Norway, ending up in Africa to be resold. While this is problematic because of environmental toxic in such items, as well as illegal according to the Basel Convention, further research should be done on the nuances of this shipment. The African markets are in fact doing what the waste strategy and circular economy want. They are reusing items that would otherwise end up as waste (Agamuthu, Cooper and Herat 2012).

This paper initially also studied the environmental impact of reuse. While the circular economy and European Strategy argue that reuse is better than recycling, some authors have nuanced this understanding by for example concluding that sofa`s and t-shirts have the highest environmental benefits (Castellani, Sala and Mirabella 2015), that old white goods

are not better to reuse than recycle because of its high water usage (Boldzocki et al 2020) and by looking at the rate to which reuse actually replaces buying a new item (Farrant, Olsen and Wangel 2010). I would argue here, however, that this should not limit the advocacy for a circular economy, since the logic behind it must be assumed to hold for most product categories, and because the aim for a circular economy is important on a more general level. Nevertheless, research that nuances the understanding can be of use for waste managers and entrepreneurs when accessing which products to reuse.

Finally, if I were to do more research on achieving a circular economy, I would take an even more holistic viewpoint. The reason being that the challenges facing our world are best addressed using a framework that acknowledges the complexity and interconnectedness of economy, nature and culture (Ingebrigtsen and Jakobsen, 2007). It seems that the culture is especially interesting, serving as an input for a more circular economy.



## 11. Limitations

I have argued that a case study and qualitative analysis was the right methodology for giving an account of different potentials of reuse. However, I have not dealt with measuring the economic values generally. With this, I mean explicitly measuring the economic potential of the different product categories (bicycles, refrigerators, tv's). A quantitative study looking at the resell value of different items could be used to give more precise economic estimates. However, the advantage of a case study analysis is to obtain rich in-depth information. Thus, this methodology was better suited to properly understand the Norwegian systems for reuse and to address areas for further research. A waste-stream analysis was also difficult because of the covid-19 outbreak this spring.

This paper has taken a broad approach to explore the phenomenon of preparation for reuse. This broad approach is congruent with the aim of opening up a research field for a possible PhD. Furthermore, I would argue that research on circular economy is necessarily broad because of the holistic worldview (Ingebrigtsen and Jakobsen, 2007) and because it is an interdisciplinary research field (Geissdorfer et al 2017).

However, this broad approach has limited the degree to which I could go deep in the different elements. For example, this relates to the reliability of the paper with regards to chapter 6, where I could have shown better how I concluded best practice, success factors and barriers.

In the process of writing this thesis, I have relied on reading and understanding circulation economics and circular economy, without attending any courses on these subjects. Circulation economics is an interdisciplinary research field, and it is argued that the mainstream economy, which I have been educated in, is too narrow for understanding the real challenges for achieving a new economy. In fact, some of the problems we are seeing in our world might be attributed to this narrow view (Ingebrigtsen and Jakobsen, 2007).

It has been a challenge to grasp and adapt to this idea. Throughout the process of writing this paper, I have come to realize that the challenges facing us must be lifted on a higher level of abstraction. This journey has taken a long time, and it is not possible to go back in time and redo the interviews, data collection and analysis to fit this view. I have found this contrast, between my teaching books in methodology (Saunders et al 2018) and Circulation Economics (Ingebrigtsen and Jakobsen, 2007) as very challenging on a deep and personal

level. With this contrast I mean the change from looking at parts of the economy, nature and culture to seeing this as “inevitably intertwined” (Ingebrigtsen and Jakobsen, 2007).

In light of this, it can be argued that this thesis has neglected some fundamental challenges. Especially, the cultural and social aspects of creating a new economy have not been emphasized in this thesis.

Nevertheless, *Circulation Economics* by Ingebrigtsen and Jakobsen (2007), addresses and presents, as I interpret them, a solution to the fundamental problems of our economic system. This fundamental solution has only been slightly touched upon in this thesis. Instead, this thesis has addressed a practical issue of preparing items for reuse, and showed how this relates to circulation economics as a practical example.

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# 12. Appendix

## 12.1 Appendix 1: Interview Guide

### Introduction

- Information about the project
- Information about recording (If approved)
- It is okay not to answer questions
- As mentioned in the briefing, and in accordance with NSD, you can at any time ask me to delete information, have access to, and change if you wish to do so.

### Part 1: Intro

Objective: Get to know the informant and the business.

- Tell me a little bit about yourself, the business, and what you do?
- What is your vision?

### Part 2: Reuse

- Can you tell me a little bit about how you work to achieve a higher extent of reuse?
- How does the actual process work?
- To which extent do you think that there exist unused secondhand values in the waste stream?
- Do you have any numbers on this?
- What do you think about the reuse's potential for a greener world?

### Part 3: The systemic side:

- What do you consider to be the most important barriers for achieving a Circular Economy in Norway? – Drivers?
- Which systematic changes are needed to utilize unused values in a better way?
- How do you experience the incentives connected to reuse?
- Is there a mismatch between what the EU says in the waste hierarchy compared with the incentives they give?
- What do you think about the dilemma of transporting what we consider waste to underdeveloped countries such as Africa?
- How does the waste handling look like for you within 2030?

### Part 4: Customer side

- What do you know about the people using the reuse stations?
- What do you know about the people not using the reuse stations?

### Part 5: Closure

- Is there anything else that can be of relevance for me



## 12.2 Appendix 2: Information Sheet (Translated)

Do you want to contribute to a research project about:

«Drivers and Barriers for enhancing the extent of reuse in Norway»?

This a question if you want to contribute in a research project where the aim is to investigate drivers and barriers for the recycling stations in Norway to achieve a circular economy. In this thesis you will get information about the aims of the project as well as what participation will mean for you.

### **Purpose**

As a part of my master's degree at the Norwegian School of Economics (NHH) I want to figure out what actors in the recycling industry see as main barriers to achieve a circular economy. Preliminary research question is:

«What does the recycling stations and central actors within reuse see as the most important barriers for achieving a higher extent of reuse? »

This involves studying the processes of how reusable secondhand products (Products that are thrown away but could be used again) can be utilized in a better way.

### **Why are you asked to contribute?**

You are being asked because you work for a Norwegian Recycling station or because you are an actor within reuse- for example an entrepreneur.

### **What does it mean if I say yes?**

If you choose to participate in the project, you say yes to a 1-hour interview. You will be asked about circular economy, waste handling and reuse of products. You will also be asked questions about what you consider problems/challenges with the existing systems, as well as solutions to this. Both sound recording and transcribed material will be stored at a local computer with password protection which only I have access to.

Participation in the study means that your opinions could be cited and published in my thesis which will be available online. You and I will agree together whether we should use your full name, place of work and position, or if we should anonymize this.

### **Voluntarily participation**

It is optional to contribute in the project. You can at any time choose to withdraw your consent without giving any reason. All of your information will then be anonymized, and it will not have negative consequences for you.

### **Your privacy- how your information is being stored and used.**

I will only use your information to the purpose I have explained in this thesis. I will treat your information confidentially.

### **What happens to your information when the research project ends?**

The project is planned to end the 01.06.2020. Quotes and reference to you in the text will be published on the open institutional archive at the Norwegian School of Economics called "Brage". The purpose will mainly be to use in further research. If we agree that we use your name in the thesis, this will be written in a thesis that are accessible online. Normally the master thesis will be available for loan 4 years after submission.

### **Your rights**

As long as you can be identified in the data material you have the right to:  
have insight into which personal information is registered about you,  
to have your personal information corrected,  
to have personal information deleted,  
to get a copy of your personal information,  
to send a complaint to the Data Protection Office or data protection (datatilsynet) about the treatment of your information

### **What gives me the right to treat your personal information?**

I treat your information based on your consent. On behalf of the Norwegian School of Economics (NHH), the Norwegian Centre for Research Data (NSD) have accessed that the treatment of personal information in this project is in accordance with the regulations.

### **Where can I get more information?**

If you have questions to the study, or want to use your rights, please contact me. You can also contact:

Knut Ims at Norges Handelshøyskole (NHH). He can be reached by mail: [knut.ims@nhh.no](mailto:knut.ims@nhh.no) or phone: 55 95 92 39.

Our Data Protection Office at NHH can be reached by mail: [personvernombud@nhh.no](mailto:personvernombud@nhh.no)

NSD – Norwegian Center for Research Data by mail ([personvertjenester@nsd.no](mailto:personvertjenester@nsd.no)) or phone: 55 58 21 17.

Best regards

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### **Declaration of consent**

I have received and understood information about the project, and I have got the chance to ask questions. I consent that:

Information about me is published so that I can be recognized. Hereunder;

Full name

Position.

Employee

or;

To contribute without name

I hereby approve that my information is being treated until the project ends approximately 01.06.2020

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(Signed informant, date)