The impact of circular end-of-life systems on linear fashion business models

Research Report
Noah van Rooij
1. This report, as part of the graduation project aimed at attaining the BA title from the Amsterdam University of Applied Sciences, has been written and/or compiled solely by me.

2. This project report (or any amended form of it) has never before been submitted by me or anyone else in the framework of a learning assignment aimed at the attainment of a certificate or degree, within the AMFI programme or elsewhere.

3. The work that was necessary for the realisation of this project was performed entirely by me. All the data that have been collected are original.

4. All quotes from other sources are recognisable in the report by quotation marks and the sources of all my information have specifically been indicated.

Noah van Rooij
14.06.2018
Amsterdam
Acknowledgments

I would first like to thank my graduation coaches Brigitte Schriks and Karen Bosch for their time and valuable advices. They guided me to find the right direction within this challenging journey of explorations, and allowed this work to be my own.

I would also like to thank the experts who were involved in the research for sharing their relevant and inspiring visions, insights and ideas. Contribution of Annet Feenstra, Bert van Son, Gwen Cunningham, Joy Roeterdink and Suzanne Smulders has been a very valuable addition to this project.

Last but definitely not least, I want to express my everlasting gratitude to my brother Lucas for believing in me, supporting me and always cheering me up. My friends and family for the endless encouragement and stimulation during the past four years, it would not have been possible without them. Thank you all for joining the rollercoaster and lighting up my ride!
This research is composed to discover how the principles of both linear and circular economies affect business models in the fashion industry. There will be looked at the past, the present and the future in order to define relevant developments, opportunities and prognoses for fashion businesses. In-depth focus will be on the end-of-life phase of products, as this is where linear and circular models are most likely to operate differently. The advantages, drawbacks, challenges and risks of both models at end-of-life will be outlined with respect to economic, environmental and societal perspectives. Ultimately, the content of this report will attempt to determine whether linear and circular models should operate solely or complement each other to join forces, and what the impact will be if they would.
# Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acknowledgements</td>
<td>3</td>
</tr>
<tr>
<td>Prologue</td>
<td>5</td>
</tr>
<tr>
<td><strong>Introduction</strong></td>
<td></td>
</tr>
<tr>
<td>Rationale</td>
<td>8</td>
</tr>
<tr>
<td>Aim</td>
<td>8</td>
</tr>
<tr>
<td>Questions</td>
<td>9</td>
</tr>
<tr>
<td>Methodology</td>
<td>9</td>
</tr>
<tr>
<td>Structure</td>
<td>10</td>
</tr>
<tr>
<td>Limitations</td>
<td>10</td>
</tr>
<tr>
<td><strong>Linear vs Circular</strong></td>
<td></td>
</tr>
<tr>
<td>Linear economy</td>
<td>12</td>
</tr>
<tr>
<td>Circular economy</td>
<td>13-14</td>
</tr>
<tr>
<td>Conclusion</td>
<td>15</td>
</tr>
<tr>
<td><strong>Circular end-of-life systems</strong></td>
<td></td>
</tr>
<tr>
<td>Access &amp; Performance</td>
<td>17</td>
</tr>
<tr>
<td>Extended Value</td>
<td>18</td>
</tr>
<tr>
<td>Encourage Sufficiency</td>
<td>18-19</td>
</tr>
<tr>
<td>Conclusion</td>
<td>20</td>
</tr>
<tr>
<td><strong>Circular effects</strong></td>
<td></td>
</tr>
<tr>
<td>Circular EOL systems Business Model Canvas</td>
<td>23-25</td>
</tr>
<tr>
<td>Challenges, consequences, advantages</td>
<td>26-27</td>
</tr>
<tr>
<td>Conclusion</td>
<td>28</td>
</tr>
<tr>
<td><strong>Final conclusion</strong></td>
<td></td>
</tr>
<tr>
<td>References</td>
<td>31</td>
</tr>
<tr>
<td>Professional journals</td>
<td>32</td>
</tr>
<tr>
<td>Books</td>
<td>32</td>
</tr>
<tr>
<td>Websites</td>
<td>33</td>
</tr>
<tr>
<td>Conferences</td>
<td>33</td>
</tr>
<tr>
<td>Appendix I</td>
<td>34</td>
</tr>
</tbody>
</table>
Introduction

Rationale
Today’s global economy is built on a linear operating model, which is proven to have generated an unprecedented level of growth and has therefore been of great benefit for many businesses in the past decades (Ellen MacArthur Foundation, 2015). At the same time, the way in which this system operates is increasingly questioned, whether it will be suitable for successful continuation in the future. Over time, the linear model has affected several external factors in ways that now forces many industries to rethink their business operations. This also applies to the fashion industry, which is currently the eight most polluting industry worldwide. The fast pace in which large quantities are extracted, produced and consumed are pressuring the earth’s natural capital (Greenpeace, 2016). This consequently leads to resource scarcities, price volatility and supply chain risks, which will inevitably affect businesses as well.

Consequently, a global turning point has arisen and attention widely shifts to finding ways in which value can be captured from existing products and materials, as in a linear pathway these mostly end up as waste in landfills or incinerators (Lacy & Rutqvist, 2015). With the call for a future-proof economic model growing louder, the circular economy have broadly been assumed to be a potential successor. According to the Pulse of the Fashion Industry Report 2017, it is stated that circular business operations could reduce negative impacts and pursue novel solutions that offer an opportunity to maintain and ensure profitable growth going forward (GFA & The Boston Consulting Group, 2017).

This research will therefore explore whether and to what extent the principles of a circular economy could complement the shortcomings of linear fashion business models. The report will primary focus on the end-of-life phase of fashion products, in order to see how circular systems, strategies and solutions could prevent clothes from becoming waste and gradually transition towards a proper industry. Ultimately, it will provide realistic insights of what it takes and yields to insert circular systems to linear operations, and outline the potential impact this would have on fashion businesses.

Aim
This research is initiated to discover the possibilities for the fashion industry to move towards a future-proof business model. At this moment, the linear business model is dominating the industry but increasingly encouraged to rethink due to its wasteful trajectory. At the same time, the circular economy is broadly recognized as a potential alternative or promising successor. Therefore, this report attempts to analyze and define the suitability of circular systems in linear models, where focus will be on end-of-life operations as part of a total transition. Ultimately, through comprehensive exploration of relevant circular end-of-life systems, strategies and processes for the fashion industry, the research aims to outline the impact these operations would eventually have on linear fashion businesses.

This report intends to share a new vision about the industry, for the industry. It aims to offer insights that facilitate the inevitable: transitioning towards a more accountable and less wasteful system that will be beneficial for businesses, the environment and society in conjunction. The ultimate goal is to confront and inspire businesses, future industry representatives and consumers to contribute in making the world a better place through fashion. Therefore, the findings will be translated in a campaign to raise awareness and encourage ways to realize this.

---

1 https://ecocult.com/now-know-fashion-5th-polluting-industry-equal-livestock/
Questions

In order to accomplish the research aim, the following research question is developed:

**What is the impact of circular end-of-life systems on the linear fashion business model?**

To be able to answer the research question, the following sub questions need to be answered:

1. **What are the principles of a linear economy and how do these differ from a circular economy?**
   The purpose of the first sub question is to identify key characteristics, advantages and drawbacks of both the linear and circular economy for fashion businesses. It aims to outline the most important differences and similarities of the related business models, to see if and how they could potentially complement each other.

2. **What kinds of circular end-of-life systems/strategies/processes are there, and how do they function?**
   The aim with the second sub question is to discover various circular end-of-life systems that are suitable for fashion businesses, and to outline the complexity of inserting them in linear business models.

3. **How will the elements of linear fashion business models be affected by circular end-of-life systems?**
   The last sub question aims to indicate what it would take if circular operations are added to linear business models. Therefore, each element of the Business Model Canvas will extensively be filled out with circular end-of-life operations, in order to provide a clear insight of what these contain of. Ultimately, the main purpose here is to define the potential consequences for linear fashion businesses when they start operating with circular end-of-life systems.

Methodology

In order to ensure each sub question will be answered optimally, multiple research methods will be used and applied. To guarantee validity and reliability of the research results, at least three sources of data and various methods are practiced.

The first and second sub questions mostly require descriptive research. The aim of using this method is to provide accurate insights and evidence about the linear as well as circular economy, and outline important characteristics, differences and similarities of both models. Additionally, this method is used to explore and define which circular end-of-life systems are relevant for the fashion industry and how they function. These results will represent the theoretical framework of the report and are mostly supported by secondary sources. The third sub questions is more explorative and therefore, requires both descriptive and evaluative research. Comparisons between existing theory and practice will provide advanced results to this part of the research. Initially, this is done by the use of academic journals and professional reports in order to give fundamental ground to the final outcomes. Additionally, the results are complemented with valuable insights gained through interviews with experts and companies that explicitly belong to the research group, defined by their experience and expectations of circular end-of-life operations. The interviews include: Gwen Cunningham, textile researcher and analyst of the Circular Textile Program for the company Circle Economy and teacher at AMFI; Bert van Son, CEO of MUD jeans; Suzanne Smulders, co-owner at LENA the Fashion Library; Annet Feenstra, Sustainability Manager at H&M Netherlands; and Joy Roeterdink, Corporate Social Responsibility manager at SuitSupply. Furthermore, case studies, observation and informational events will be used to objectify the findings.
Structure
The first part of this research will contain the results coming from the theoretical framework, where relevant theory is researched, stated and extensively explained. This provides answers to the first two sub questions, debated in chapter one Linear vs Circular and two Circular end-of-life systems. Both chapters will end with an evidential conclusion of the research findings. The next chapter, named under Circular Effects, is intended to give answer to the third sub question. This chapter will also end with an evidential conclusion of the related research findings. Finally, the report will be closed with an overall conclusion, connecting all methods and data used to state the findings and display new insights gained from the total research.

Limitations
Although the content of this research was carefully composed and selected, there are some shortcomings and limitations to the final outcome. The topic as explored in this report is still in development and not yet widely applied, meaning that the results are partially based on expectations and assumptions. More practical examples and results would have increased the validity of the results, and there might be unforeseen consequences when the theory as explained in this report is realized.
Furthermore, the campaign that was initiated to complete this project would require more extensive research before it can be realized, which could not yet be finalized within the limited time slot.
This chapter contains serious theory about two economies with different characteristics, in order to discover the possibility to eventually complement one another.
Principles of a Linear Economy
The linear economy is a term for the current economic growth model that has been used since the Industrial Revolution. Linear refers to the cradle-to-grave flow of resources (Lacy & Rutqvist, 2015). The global economy’s evolution has been dominated by this linear model of production and consumption. The process here is based on the extraction of raw resources that are manufactured into desired products. The products thereafter, are sold and used until the consumer decides to discard them as waste. Therefore, this economy is also increasingly described as being built on the principles of ‘take, make, waste’.

Generally, linear business models are sales oriented and revenues are mainly generated by selling as many products as possible in order to continuously increase economic growth (K. Raworth, 2012, EllenMacArthur, 2016, Appendix 1.1).

For the fashion industry, the rise of fast fashion has been a determinative driver of growth (Kim, Jung Choo, Yoon, 2013). Fast fashion is a phenomenon that is established with the turn of the century and is based on a quicker turnaround of new styles, and an increased number of collections per year that are mostly low priced. Strategic supply chain management, merchandising techniques and retail technology have enabled businesses to quickly respond to market developments and consumer demands. In combination with large order quantities and production facilities mostly located in developing countries, this enabled companies to lower the price of clothes. As a result, the ever-changing trends of fashion have become more affordable and accessible to a very broad audience. This allowed consumers to frequently update their wardrobes and therefore, more than ever express themselves through fashion.

On the other hand, the acceleration of production processes has encouraged businesses to design products that have a relatively short lifespan, also described as built-in obsolescence, in order to be able to continuously sell new products (Achterberg, Bocken & Hinfelaar, 2016). For the fashion industry, this resulted in a doubling of clothing production from 2000 to 2014 (Greenpeace, 2016). Recent numbers from the McKinsey Global Fashion Index even expect sales growth to triple between 2016 and 2018 (BoF McKinsey, 2017). Although the linear model has generated an unprecedented level of economic success and wealth for several parts of the industry, the growth of the industry comes with increased environmental and social costs.

Population growth and emerging consumption trends are additional factors that have increased the demand for more and faster products. Consequently, this has led to a growing need for resources, as well as time pressures in all parts of the supply chain. Resource scarcity, price volatility and poor working conditions along the value chain therefore, are the inevitable result (Appendix 1.1, Ellen MacArthur, 2015). Other impact areas include excessive water and chemical usage, CO2 emissions, and the incentive to minimize waste during use and product end-of-life is mostly unaccounted for (Lacy & Rutqvist, 2015).

According to the Pulse of the Fashion Industry report 2017, the fashion industry is expected to face distinct restrictions on one or more of its key input factors, leaving it unable to grow at the projected rate and in the long run, unable to continue under its current operating model (GFA & The Boston Consulting Group, 2017). Furthermore, it is stated that this growth model, favored by economies and most companies for the past 250 years, is living on borrowed time. The linear model will, sooner or later, not be viable as the availability of many resources cannot keep up with the increasing demand (Lacy & Rutqvist, 2015).

However, breaking through the lock-in of today’s system by acting differently and pursue innovative solutions offer an opportunity for businesses to maintain and ensure profitable growth for the future. In recent years already, fashion companies have become increasingly aware of the threatening consequences related to their current system and therefore, started to embrace the importance of sustainability (BoF McKinsey, 2017). One of the forces behind this movement is the realization that sustainability leadership can serve as a real source of differentiation. Additionally, the rise of advanced sustainability technologies across materials, products and processes is a driver for growing interest in sustainable principles among companies. Incorporating sustainability in the end-to-end processes with concepts around longevity, emphasizing high-quality and take-back initiatives are gaining wider recognition across the industry. It is stated that sustainability will evolve from single initiatives to being an integral part of the entire fashion value chain, with focus shifting to a circular economy. The next paragraphs therefore, extensively elaborate on the principles of this alternative operating model.
Principles of a Circular Economy
Gradually, the negative impacts and externalities of a linear system have gained wider recognition. Not only in terms of environmental and social issues, but also the threatening effects this will eventually have on companies if continuing business as usual. A new operating model therefore, is increasingly assumed as a potential successor and is based on the principles of a circular economy.

The general concept underlying the circular economy has been developed and defined by various schools of thought. It is mostly referred to as a Cradle to Cradle design philosophy and flow of materials (McDonough & Braungart, 2002), a closed-loop system through reuse and recycling of goods and materials (W. Stahel, 2010), and an industrial system that is restorative and regenerative by design (Ellen MacArthur, 2015).

All methods, definitions and models cover the key principles of a circular economy: decouple growth from dependence on new resources by keeping materials at their highest utility and value, and continuously cycle everything back and forth between production and consumption with minimal loss in quality. The main principles of these schools of thought are complementary to each other and provide the circular economy’s foundation as elaborated on beneath.

Optimize value through reverse chains
In a circular economy, the closed loop consist of two supply chains: a forward and a reverse chain. In the usual forward chain, materials and products are being produced and consumed. In a reverse chain, products are collected back and recovered to re-enter the forward chain (M. Antikainen & K. Valkokari, 2016). This enables the potential to re-capture value from existing products, components and materials by optimizing resource yields. In order for the reverse chain to be effective, designing for remanufacturing, refurbishing and recycling is must to keep technical components and materials circulating and contributing to the economy (Ellen MacArthur, 2015).

System networks
Circular models are by nature networked as they require collaboration, communication and coordination within complex networks of interdependent actors and stakeholders (M. Antikainen & K. Valkokari, 2016). Circular business models therefore, do not necessarily close material loops within their internal system boundaries, but can be part of a network of business models that together are regarded as circular (B. Mentink, 2014). Optimally, a circular economy enables one system’s waste to be the next system’s input, and creates an ecosystem that works for several businesses (K. Raworth, 2012).

Energy and materials from renewable sources
All energy needed to sustain the circular economy should be renewable. This is practiced through all circular operations, meaning that when resources are needed, they are responsibly selected. The system only adopts technologies and processes that support renewable or better-performing input. Therefore, circular systems enhance natural capital by only creating for regeneration, and encouraging flows of nutrients within the system (Ellen MacArthur, 2015). Ultimately, this decreases the dependency on resources and lessens the necessity for continuous extraction and development of new materials.

Waste prevention
The ultimate aim of a circular economy is to result in zero-waste value chains. When natural resources are used in connected loops rather than consumed and discarded in linear flows, waste can be used as valuable input again. Additionally, as the system is powered by renewable and regenerative energy, wasteful processes along the chain can be minimized and ultimately, eliminated.
Circular business models

Moving towards a circular economic model requires a new way of thinking and doing business (N.M.P. Bocken, 2016). Circular business models can be defined as the rationale of how an organization creates, delivers and captures value with and within closed material loops (B. Mentink, 2014). These models are mainly focused on converting waste into valuable inputs through extensive services and recycling activities, and minimizing end-of-life disposals.

In a circular model, the aim of businesses shifts from generating profits by solely selling goods, to generating profits from the flow of materials and products over time (N.M.P. Bocken, 2016). Therefore, growth will be generated differently as circular business models meet consumer demand in various ways that reduce the need to constantly produce new products. This can be achieved when businesses start to provide access to products rather than ownership over them through rental and lease models, or by the offering of high service levels to extend the lifecycle of products. Ultimately, they would focus on designing for circularity to ensure responsible material input and safeguard products at end-of-life. In the long run, it is stated that these models have potential to create economic value for businesses through new service markets and retrieved value from products and materials (M. Antikainen & K. Valkokari, 2016).

However, at this moment the business case for circularity has not been proof from an economic standpoint, and the infrastructure and technologies needed to support a good business case are not yet developed (Appendix 1.1 & 1.2). Furthermore, the principles of circular business models run contrary to the current shareholders’ mentality, where economic success is based on the process to continuously increase growth by producing more to earn more (K. Raworth, 2012, Appendix 1.1).

Marrying the concept of circularity therefore comes with several challenges for businesses, and they will need convincing grounds to justify a circular direction. Instead of concentrating purely on creating economic value, circular models take into consideration the benefits from societal and environmental perspectives as well (M. Antikainen & K. Valkokari, 2016). In the long run, this could advantage businesses, as effective utilization of resource inputs will firstly lower material costs but more importantly, it will decrease dependency on natural resources. Treating nature as a stakeholder could therefore also reduce business risks going forward as ultimately, this would avoid scarcities, price volatilities and wasteul processes along the value chain.

“The circular economy comes with a new vision of the treatment of energy, resources, value creation and entrepreneurship.”
Conclusion

The linear model has proven to be incredibly beneficial for businesses and the global economy over the past decades. It allowed for economic growth without limitations and therefore, revealed wealth and power to several parts of the world and industries. Growth here is generated based on constant extraction of new resources in order to realize a continuous throughput of goods. Therefore, the linear economic model is highly reliant on natural capital and human capacities. Over time, this has faced the system to several restrictions as the required amount of planetary and human resources became tangibly stressed.

Meanwhile, principles of the circular economy could complement the shortcomings of linear models, as these are focussed on highly valuing what is in the system already by reusing resources with support of innovative systems and technologies. Circular operations ultimately aim to optimize, control and close the entire flow of materials in order to continuously cycle everything back and forth between production and consumption within circular system networks.

However at this moment, the quantities that are collected back to be recycled are still very minimal as compared to what is produced and additionally, recycled materials do not have equal qualities nor the capacities of raw materials. This would mean that to some extent, raw resources will still be needed (Appendix 1.1, 1.2, 1.3). In fact, this would not be a problem, as it is the excessive amount to which a linear system uses and discards of them that leads to wasteful processes and effects. An essential starting point to minimize negative externalities would therefore be to displace the dependency on virgin resources by making efforts to recycle what is extracted, and create a more circular stream of material input (Appendix 1.1). Instead of wasting materials in landfill or incinerators after they are consumed, circular system networks would enable resources to become useful again regardless of their final purpose. The ultimate intention however, would be to retain the original or higher qualities of materials. This would require a more strict control on what is allowed from an input perspective. When input becomes more transparent, sorting and recycling processes could be facilitated, making the total system more efficient and effective.

Altogether, it became clear that circular principles could unlock the negative effects of linear operations. However in reality, 100% circular business models do not exist and it is doubtful if this should be aimed for, if ever achievable. While from environmental and societal standpoints this might be ideal, it is also stated that it could destroy the usefulness of established companies (M. Antikainen & K. Valkokari, 2016). A reasonable balance between both models would possibly solve many concerns already, and back up both system’s difficulties.

Therefore, the next chapter will discover how a gradual shift towards a future-proof system could be brought forward in the fashion industry, by focussing on how materials could be prevented from becoming waste. This will be done by outlining systems, strategies and solutions that could realize a circular end-of-life phase of fashion products.
This chapter will provide insight in how fashion businesses can start to reshape the life-‘cycle’ of clothes from a straight line into a closed loop with support of circular end-of-life systems.
Circular end-of-life systems

Circular operations are focused on capturing the value of products and materials in multiple lifecycles through innovative systems, processes and new ways of design. For the fashion industry, increasing the utilization of clothes and safeguarding materials which are no longer used could be the most powerful way to reduce pressure on resources, decrease negative impact and reduce waste (Ellen MacArthur, 2015). The following paragraphs will therefore outline various circular end-of-life systems, strategies and solutions which could be implemented by fashion businesses.

Access & Performance

The Access & Performance model is an alternative to the linear sales model, as it is built on the principles of delivering the services and capabilities of products rather than ownership over them. These models aim to satisfy users’ needs without needing to buy and own physical products, but rent or lease them instead (N.M.P. Bocken, 2016).

There is a variety of Access & Performance models that suit the needs of different groups of users. Ultimately, these models would increase the utilization of clothes as products will be accessible to multiple consumers over time. This way, the demand for new clothing production potentially decreases while at the same time businesses retain final ownership and control over products. This enables them to keep products in appropriate conditions for longer and finally, prevent clothes from becoming waste at end-of-life. Product take-back is thus not only facilitated but also secured. Efficient and responsible product lifecycle and post-consumer management would consequently reduce negative environmental impacts as a result. Fashion related rental models can provide consumers with clothing through Subscription models, Temporary Occasional models or Long-term rental agreements as extensively explained in the next paragraphs.

Subscription models

This model is characterized by monthly fees that allow consumers to have a fixed number of items for rent at any time. This way of accessing clothes will mostly attract customers who desire frequent changes of outfit, as it enables them to quickly change and adapt their wardrobes to the latest fashion trends. Instead of regularly having to buy new clothes, this model offers a cost-efficient alternative, beneficial for a significant group of consumers with rapid changing fashion demands (Appendix 1.4, Ellen MacArthur, 2017).

Temporary Occasional models

These models provide customers with affordable access to high-quality clothes which they only need for a limited time. Instead of buying and owning clothes for one-off occasions or short and changing needs such as baby, children’s and maternity wear, this model allows customers to return products when no longer suitable (Ellen MacArthur, 2017). Ownership is retained by the retailer and re-distributed after quality checks and cleaning procedures, providing another customer with the next service of the same product.

Long-term rental agreements

Here, consumers mostly access products for a longer period and pay the price in fees divided over time. In this case, customers are often provided with high-quality products due to the increasing financial attractiveness of producing more durable products, as companies can capture more value when clothes last longer (Appendix 1.3, Ellen MacArthur, 2017). At the same time, consumers can access high-quality clothes without the usual associated upfront costs or risks, and return their product at all times.
Extended Value

This model is characterized by its focus on better-performing products and high levels of service, as well as capturing the residual value of products and materials. Firstly, this is executed with personal customer service and additional customized product offers, both in-store and with outsourced tailoring partners, in order to provide customers with clothes that excellently fit whenever they intend to make a purchase (Appendix 1.5 & 1.6). Additionally, when products are damaged, consumers are provided with extensive repair services in order to increase the utility of items. When products at some point have ceased to function, incentives to get back products for remanufacturing or recycling will inform and guide customers to bring back their products, and in some cases provide them with a special offer as for instance a discount or gift voucher (Appendix 1.2 & 1.3, L. Hoang, 2016).

Initially, Extended Value operations would slow down material loops by increasing the utilization of clothes, decreasing the need to constantly extract new resources. Resource loops could potentially be closed when all products at end-of-life would come back. Ultimately, this would prevent clothes from becoming waste while also enabling businesses to recapture the value of products, components and materials for own employment. The next paragraphs will outline the characteristics of Extended Value operations in fashion businesses.

Clothing care instructions

A relatively simple way to increase durability of fashion products would be to provide customers with clear information and guidelines on how garments should be treated and washed. Preferably, this would be done by the staff in stores whenever a purchase is made, in order to secure the consumer is correctly informed about their specific product. For online purchases, an additional file could be attached to the shipment in order to have equal and effective communication to all customers. This could prevent product damage and weakening at an early stage and therefore, increases the chance for clothing to last longer (Appendix 1.1, 1.3, 1.6, Ellen MacArthur, 2017).

Warrantees & Take-back incentives

Product warrantees could be another effective way to increase the utility of clothes. These are characterized by extensive tailoring, cleaning and repair services provided to all customers. This could either be realized in-store by specialized staff or executed by third party tailoring companies who can replace certain product components. Additionally, incentives to secure products will come back when they are no longer used or have ceased would enable businesses to recapture the value of materials by remanufacturing or recycling products and materials collected back. Gift vouchers or discount offerings can provide customers with a small return for the value of their items, while also increasing the chance that they will bring their products back. This could potentially create a higher commitment to durability by fashion consumers and besides, allow for long-lasting relationships and increased customer loyalty (Appendix 1.1,1.6,Ellen MacArthur, 2017).

Encourage Sufficiency

This model takes it one step further: besides offering high levels of service, Encourage Sufficiency is initially based on the development of durable products which are designed with disassembling and recycling in mind. The main principle is to make products that last and allow users to hold on to them as long as possible (N.M.P. Bocken, 2016). It is stated that integrating circular economy concerns at an early stage in the product design process is important, because once product specifications are being made, it is more difficult to make adjustments.

Sufficiency-based models are often premium as the offered products here are high-end. The system is characterized by solutions that actively seek to reduce end-user consumption. This is realized through durability principles, repair services and warrantees, upgradability, and disassembling and recycling activities. Another important feature is its non-consumerist approach to marketing and sales, fewer high-end sales that are long-lasting, rather than built-in obsolescence, products that are designed with a limited lifespan (N.M.P. Bocken, 2016). Designing long life products is an important design strategy defined to slow and increasingly close resource loops by safeguarding and prevention of end-of-life disposals. The following paragraph therefore, outlines and extensively explains the key operations and potential circular design strategies for fashion businesses.
**Design for Durability**
This strategy relates to the physical durability of products. Material selection is a crucial focus point in the sourcing process, followed by innovative design and production techniques to create clothes that have an enduring lifespan. Materials are selected based on high performance qualities and additionally, they have to be approved from circular standards, relating to easy-to-disassemble and recycling characteristics. This means that textiles preferably exist of single raw materials rather than blends, and that they are responsibly extracted (Appendix 1.1, 1.2, 1.3, N.M.P. Bocken, 2016).

**Design for emotional Attachment & Trust**
In order to optimize the utilization of clothes, fashion businesses can focus on creating products that will be loved, liked and thus, trusted longer. An emotionally durable item is one that is highly valued by its owner and could be enhanced by involving the user in the making or remaking of their garment (N.M.P. Bocken, 2016). This could be achieved through for example tailor-made, custom-ordered, designed, maintenance or redesign services. Involving users in the design and repair of clothing could lead to more connectivity and active engagement with garments (Ellen MacArthur, 2017).

**Design for dis- and reassembly**
Design for dis-and reassembly is a strategy that considers the future need to disassemble a product for repair, refurbish or recycling. It ensures that products and parts can be separated and reassembled easily (N.M.P. Bocken, 2016). This is essential in order to optimize efficiency in the collecting and sorting process, and ultimately facilitates the recycling process as materials are easily separated and send into the correct cycle.
By extending or increasing the quality of clothes, the opportunity for clothes to be sold again opens up as well. Incentives or agreements can secure products will come back to the original company when they are no longer wanted or used by the first consumer (Appendix 1.3). This allows businesses with elements of both Extended Value and Encourage Sufficiency models to also capture more value from one product, either in additional second-hand/vintage assortments or by recycling the materials to make or complement new products with.

In all three cases, when products have reached the point where they can no longer be maintained through reuse or repair, recycling is the final end-of-life solution to realize a circular pathway. When linear fashion businesses insert the principles of Access & Performance and Extended Value models, the easiest way to ensure sorting and recycling activities is to outsource it to third parties. This can for instance be executed by I:CO, a global company that operates with an innovative take back system to collect used clothing and gives them a new life through large scaled re-use and recycling activities. However, the quality of materials is often still lost in the process of recycling as clothing is compiled out of blended materials (Appendix 1.1, 1.2, 1.3, Ellen MacArthur Foundation, 2017). Therefore, it is crucial that design and production efforts generally start to reconsider the use of input materials in order for recycling to become a more efficient process and ultimately, provide the fashion industry with new input materials with minimum need for raw input completion (Appendix 1.1).

Furthermore, with operation of circular end-of-life systems, reverse logistics are just as critical as outbound logistics. Either when products need to be returned after rental or require to be repaired, collected back and recycled, this comes with additional transportations, which requires an additional infrastructure.

Conclusion

From the research as explored in this chapter, it becomes clear that circular end-of-life systems are focused on extending, reusing and recycling products at all times after they are sold and used. Access & Performance models could possibly be added to business operations and would introduce a new way of clothing utilization. While it is said that some products will always be preferred owned, it is also stated that sales and rental models can very happily co-exist (Appendix 1.1 & 1.4). This could be the first step to slow down production and excessive resource extraction, while also capturing more value from existing products and materials. Furthermore, Extended Value operations could be inserted in established businesses by starting to add repair services to the companies’ routines. This also applies for take-back incentives, which would become an additional effort for companies. Although these steps would require additional tailoring, logistics and recycling partners, in the long run it could potentially save material and production costs.

Encourage Sufficiency models on the other hand, require more radical changes and can therefore be most challenging for linear business to embrace in the short-term. However, by ensuring safe material input and durable designs, this model will put minimal pressure on natural resources and more importantly, decrease its dependency on external factors. In the long run, this potentially closes material loops and allows businesses to benefit from ongoing material value.

Ultimately, it could be said that there are opportunities for linear businesses to take steps in the short-term, but that a combination of all systems would optimize the results and reduce wasteful processes in the fashion industry. The implementation of all circular end-of-life systems would however, in all cases require change to linear business operations. In order for linear fashion businesses to get a better understanding of how this would affect their current model, the next chapter will outline the transitional characteristics of circular end-of-life alternatives.
“Circularity is not an end goal. It’s a means to an end.”

Gwen Cunningham
The world would be neat and tidy if implementation of circular end-of-life systems was an effortless job, but this is certainly not the case. This chapter will therefore outline the potential changes and effects for fashion businesses when starting to operate with one of the three circular systems.
The implementation of circular systems in linear fashion business models is intended to prevent products from becoming waste at end-of-life. Building on the principles of the Access & Performance, Extended Value and Encourage Sufficiency operations, each system has its own focus points and key operating efforts. The following paragraphs will first outline the changes each system will bring in context of the Business Model Canvas, and finally discover the potential challenges, consequences and advantages for linear fashion businesses when implementing these elements.

**Value Propositions**

Eco-innovation would become an additional competitive advantage for businesses in case of employment of each of the three systems, as circular operations will serve as a source of differentiation (M. Lewandowski, 2016, N.M.P. Bocken, 2016). With Access & Performance operations this would be achieved as customers will have access to products without having to buy them on full price, offering an attractive financial alternative to regularly buying new clothes. Leasing channels and assortments could therefore attract a whole new customer to the business, influenced by the innovative activities. Furthermore, refurbish and repair warranties of Extended Value models would create additional value for customers in terms of high, customized service levels and increased product usability. The offering of durable and sustainably designed products in Encourage Sufficiency models could become a unique selling point for businesses, and additional high levels of service would increase clothing utility and customer loyalty. Ultimately, product take-back efforts and incentives of all three systems would enable businesses to optimize the residual value of products and materials and minimize end-of-life disposals.

**Key Partners**

Reverse logistics partners are required by employment of all three models in order to realize the circular infrastructure after products are collected back (Appendix 1.1, Circle Economy, 2015, Ellen MacArthur, 2017). These can either be original partners with additional agreements for execution of reverse activities, or newly sourced partnerships. Cleaning, refurbish and repair partnerships will be highly important in all three cases as well, in order to make sure products will be kept in appropriate conditions and cycle through multiple uses or meet customer service levels. Sorting and recycling companies will also become crucial partners to make sure all products and materials will continue to be useful after their first life. Furthermore, seasonal collections can be supplied by original manufacturing partners, but need to adapt to the required product standards of each operating system. In some cases this could mean that new manufacturing partnerships have to be contracted. Additionally, consumers will become important partners in the sense that they will partially take over the role of the supplier, as returned products will provide businesses with input and material for reuse, resell or recycling activities (Appendix 1.1, 1.3, Circle Economy, 2015).

In case of Access & Performance employment, a business can also decide to supply the leasing assortments to a third party for execution of the subscription and rental activities, examples can be clothing libraries or platforms that already own the required systems (Appendix 1.4). For Extended Value models, machinery suppliers to realize in-store repairs and customized services would require additional partnerships and specially trained staff for execution of the services (M. Lewandowski, 2016). Implementation of Encourage Sufficiency operations requires partnerships to support and execute circular textile development, this expertise can be sourced in for example innovative textile experts and universities (M. Lewandowski, 2016, N.M.P. Bocken, 2016). Additional partnerships could be with companies to control pre- and post consumer waste when this cannot be managed by the company or other contracted partners.
Key Activities

Initiating, development and execution of product take-back systems will in all cases be a key focus point when starting to operate with circular end-of-life systems, as this is the turning point where products will be prevented from ending as post-consumer waste. Attractive incentives, gift vouchers or other offers to increase the chance for customer to bring back their products will have to be developed. Taking back products goes hand in hand with managing internal reverse activities as checking, sorting and storage of collected products (Appendix 1.4, Circle Economy, 2015). Depending on the condition of products, decisions can be made on what will happen next, varying between reuse, resell or recycling options. In case a selection of returned products will be reused by the business itself, this would require development of an additional vintage or second-hand platform where this assortment can be resold (Appendix 1.3, L. Hoang, 2016).

Activities around Access & Performance operations will mainly be focused on development of the physical leasing platform and/or online leasing section, and managing the administration system to control subscriptions, memberships and registrations, and keep track on products (Appendix 1.3 & 1.4). Additional activities that come with Extended Value operations would be the handling of in-store as well as outsourced tailoring and repair services, and managing the repair as well as returned inventory (Appendix 1.3, 1.5, 1.6). Encourage Sufficiency efforts would in most cases require external expertise to realize circular product development through innovative sourcing, design and production activities (L. Hoang, 2016, M. Lewandowski, 2016, N.M.P. Bocken, 2016). Internal activities would be focused on experimentation with materials and processes. Furthermore, controlling the material chain and keeping track on products will be needed to maximize closed-loop operations.

Generally, HR training programs would be needed to make sure each system is executed correctly and accurately by all employees in the business (M. Lewandowski, 2016). With adaption of circular end-of-life operations it is important that the new direction is applied coherently throughout the entire organization in order to be effective. Finally, convincing marketing efforts will be highly important to communicate and introduce consumers to the shift, create awareness around the innovations and effectively find ways to win their contribution (L. Hoang, 2016).

Key Resources

Whereas in linear models resources mainly come from the extraction of raw materials, with operation of circular end-of-life systems, returned products and materials become an important additional resource for businesses (M. Lewandowski, 2016, N.M.P. Bocken, 2016). Although not all returned and recycled materials will be optimally useful, the need for extraction of raw materials will be limited as this is aimed only to be used for complementing the recycled qualities (Appendix 1.1, 1.4). Remaining stock will as well become a valuable resource for businesses to reuse or recycle leftover products, components and materials for new collections. Newly sourced materials should only be of better performing or sustainable qualities in order to meet the circular standards of each system.

An important additional resource for Access & Performance operations would be the system software to manage registrations and subscriptions, and keep track of the location of products (Appendix 1.3, 1.4). Additional Extended Value resources would be the machinery for in-store repair and cleaning services, such as sewing machines and advanced steamers.

Innovative resources and knowledge to realize sustainable and circular textiles will be crucial with operation of the Encourage Sufficiency system. Ultimately, all systems will require dedicated human resources who are able to accurately handle the new activities.

Channels

With operation of each circular end-of-life system, the original retail space and e-commerce channels can remain a platform for accessibility to products. Other digital platforms as social media will be important to promote the new activities and service offers of the business, and create awareness and excitement around their innovative developments (M. Lewandowski, 2016).

In case of Access & Performance operations, an additional assortment or online section has to be developed to present and manage the leasing collection (Circle Economy, 2015). Another possible channel would be a third party platform handling the leasing operations (Appendix 1.4).

For Extended Value and Encourage Sufficiency systems, an additional space or section would have to be developed in case returned products will be sold in vintage or second-hand assortments.
Customer relationships
In case of operating with each of the three systems, businesses will get repeatedly in touch with customers, either through subscription touch points, execution of repair services or take-back incentives and agreements (Appendix 1.3, 1.4, 1.5, 1.6, Ellen MacArthur, 2017 M. Lewandowski, 2016). This allows for a more intimate and personal relationship with customers, as well as increased brand loyalty and a consistent customer base. Additionally, the introduction of innovative operations allows for community building as it could give the feeling of achieving something good together, often resulting in a stronger sense of belonging and attachment to the brand (N.M.P. Bocken, 2016).

Customer segments
Initially, businesses will introduce the operations of each system to their present customer base. New customer segments attracted by the innovations would in the first place be people with green interest, for who sustainability is an important aspect when buying clothes (N.M.P. Bocken, 2016).
Access & Performance operations will mostly attract consumers who are trend sensitive and frequently demand a change of style, as well as curious consumers who like to experiment with a different system (Appendix 1.4, Ellen MacArthur, 2017).
Operation of Extended Value and Encourage Sufficiency systems will appeal to a more mature consumer who seeks quality and personal service, and for that reason as well to regular premium and high-end consumers (Appendix 1.4, 1.5, 1.6, N.M.P. Bocken, 2016).

Cost structure
Original labor, rent and machinery costs will remain the fixed costs base for businesses. Production costs still have to be made but will potentially be lowered when there is less need to constantly produce new collections in the amounts businesses currently do. Material costs on the other hand, will increase as better-performing, recycled or sustainably sourced materials are more expensive than virgin materials (Appendix 1.3, 1.2, 1.5). New expenses will in all three cases have to be made in order to realize the product cleaning and repair services, both in-stores and outsourced to partners. Reverse logistics will require additional costs streams as well (Circle Economy, 2015, N.M.P. Bocken, 2016). Furthermore, expenses for employee training programs in order to secure correct system execution and communication will be required to provide them with the needed expertise.
In case of Encourage Sufficiency operations, development and (pre) processing of materials will become a big part of the additional expenses (Appendix 1).

Revenue streams
New and additional ways of generating revenue will be a result of sales made from retrieved materials, products or components (M. Lewandowski, 2016, N.M.P. Bocken, 2016).
For Access & Performance operations, new revenues will depend on registration and periodic subscription fees, as well as progressive purchases for long-term rentals (Appendix 1.3, 1.4, Circle Economy, 2015). In case of Extended Value and Encourage Sufficiency models, premium margins on products and services can generate additional revenues for businesses.
Access & Performance

The most significant effect on businesses by operation of Access & Performance systems would be the realization of a shift from selling products to offering accessibility to them. As shown from the required efforts throughout the Business Model Canvas, it would ask for new partners and channels, new operational efforts and adaption of a total different system to execute the leasing assortment. Therefore, implementation of this system comes with several consequences and challenges for established fashion businesses, outlined in the following paragraph.

In the first place, profits from Access & Performance operations will not be immediate like they are in a linear sales model, as leasing assortments will generate revenues spread over an X period of time. This would mean that profits will be uncertain, depending on the number of times items are leased and for how long. Although subscription fees might capture additional value on the long-term and the margins could be better, the upfront finance and delayed return on investments in products are discouraging factors for businesses when operating with Access & Performance systems (Appendix 1.3). Additionally, the administration of registrations and subscriptions would require businesses to invest in the system software, new expertise and additional hours of processing on a regular basis (Appendix 1.3 & 1.4). Furthermore checking, cleaning and repair costs and efforts continuously have to be made in order to keep products in the best possible conditions to last in multiple uses, requiring new expertise and machinery. Another challenging factor would be that owning products could be preferred by customers as they believe to have an emotional relationship with fashion items (M. Lewandowski, 2016, Appendix 1.4). This could lead to a loss of customers who will consequently look for alternatives that meet their desires.

However, Access & Performance systems could also positively affect businesses and potentially come with several economic advantages. Various payments for single products from multiple subscription and pay per usage fees could allow for increased profits through reusability and durability (N.M.P. Bocken, 2016). As businesses will be repeatedly in touch with customers through subscription contracts, this model allows for building strong relationships, receiving feedback and increased customer loyalty (M. Lewandowski, 2016). Brand exposure in different channels could additionally attract new customers and increase interest among a wider audience. Furthermore, reduced production costs could create economic advantages when the total need for continuous streams of new products decreases.

Extended Value

The required efforts of operating with Extended Value systems would mainly affect businesses at the point where products need to be refurbished, repaired and taken back after they are sold. As elaborated on throughout each element of the Business Model Canvas, this would ask for additional service offerings, new partnerships, and realization of new channels and reverse systems.

In the first place, increasing the utilization and durability of clothes would mean that businesses will need to offer extended tailoring, repair and refurbish services. This would require new expertise, machinery and management of inventory that needs to be processed. This will be challenging when there is a lack of knowledge and experience in the business on how this can be executed efficiently, as well as financing third party executives to realize a part of the services (Appendix 1.6). Additionally, the initiation of a take-back system would require effective communication efforts and customer incentives in order to make sure products will return to the company. Regardless of how these products continue to be useful through resale or recycling activities, both cases would require additional labor and logistical costs. At the same time, it would allow for reduced material costs and new revenue streams if products are resold in additional channels of the business, or when value from retrieved products and components is captured to produce and complement new collections with (N.M.P. Bocken, 2016).

Extended Value operations could thus also provide businesses with additional profits while creating new value as well. High-service levels and resale activities can feed the perception of quality, and would therefore become an additional USP (Appendix 1.3, 1.5, 1.6, Ellen Mac Arthur, 2017). Furthermore, continuous involvement of businesses with their products through the offered services will allow them to safeguard their reputations and control products at end-of-life. Ultimately, this system would not only lead to increased clothing utility and waste prevention, but also increased customer satisfaction and brand loyalty (N.M.P. Bocken, 2016, Ellen MacArthur 2017, Appendix 1.3, 1.4, 1.5, 1.6).
Encourage Sufficiency

Operating with Encourage Sufficiency systems would require more radical change in businesses, not only to make sure products will come back but also throughout many steps of the product development process. The characteristics as explained in each element of the Business Model Canvas would affect businesses in finding new ways to realize the innovative sourcing, design and production efforts as required in this system. Cooperative networks and partnerships are key here, as the operations require specific processes, capabilities, supplies and financials which can only be realized with support of third parties and experts (B. Mentink, 2014, Lewandowski, 2016, Appendix 1.3). Therefore, businesses will face several challenges when starting to implement the Encourage Sufficiency system, these are extensively outlined in the paragraph beneath.

First of all, the required sustainable material standards for Encourage Sufficiency operations to ultimately close material loops require a lot more effort and are more expensive than the use of virgin materials, this will face businesses with less profitable material decisions (Appendix 1.1, 1.2, 1.3). High investments in research and development to realize the materials and processes of this system will not be without risks, as the results for businesses remain quite uncertain and thus, economically unattractive. Although much research is going on already and actions can be taken based on reliable predictions from scientists and experts, the required technologies to optimize the systems are not available, nor commercially viable at this point (Appendix 1.1, 1.2, 1.3). It could therefore be stated that the processes related to Encourage Sufficiency operations will only become commercially attractive once they get scale, which could take years of development (L. Hoang, 2016). Additional efforts to realize an effective take-back system will have to be made in order to generate revenues from retrieved value of products and materials, requiring strong marketing and communication initiatives and customer agreements (Appendix 1.3, L. Hoang, 2016).

On the other hand, the relevance of businesses potentially increases when everything in the system is constantly valued (Appendix 1.2). Some business cases have already experimented with Encourage Sufficiency operations and advantaged from premium margins and long-term customer loyalty (N.M.P. Bocken, 2016, L. Hoang, 2016). Their operations can be characterized by a non-consumerist approach to sales, reducing consumption while gaining competitive advantage through marketable eco-innovations, creating credible reasons for shareholders to invest and pursue future growth (M. Antikainen & K. Valkokari, 2016, L. Hoang, 2016, Appendix 1.2).

“The financials are the most difficult part of a circular economy.”

Bert van Son
**Conclusion**

The most impactful effect of marrying circular end-of-life systems to linear business models, will be the continuous involvement of companies with their products after they are sold. Unlike linear operations, where the responsibility of businesses ends once a purchase is made, these systems in all cases require efforts to make sure products will be useful again after their first life through extension and recycling activities.

Initiation and development of effective take-back systems will therefore be priority when starting to operate with circular end-of-life systems. Consequently, this would mean that a reverse network of partners, systems and channels will have to be build and added to the current business operations. This would challenge businesses with additional activities and costs to realize the reverse refurbish, repair, logistics, sorting and recycling efforts. As there is no proof from an economic standpoint for these operations yet, a shift would face businesses with high up-front investments and uncertain long-term effects. Additionally, getting back appropriate volumes to scale up recycling is still very difficult at this moment (Appendix 1.2 & 1.5). Consumers are highly unaware and unknowingly about the importance to return unworn or teared clothes, while brands are having a hard time finding the right communication tools to get the message through (Appendix 1.1, 1.2, 1.4). Effective realization of circular end-of-life systems would therefore require long processes of development and could take years to stabilize (L. Hoang, 2016).

However, it is stated that capturing the value of products and materials collected back will advantage businesses with new profit possibilities, increased competitive advantage through eco-innovations, long-term contracts and partnerships throughout the value chain, and increased customer loyalty. The mitigation of price volatility, as a result of less need for excessive resource extraction, could directly benefit businesses and the environment, decreasing supply chain risks as well.

Ultimately, these systems would build resilience against strategic and environmental challenges the industry is currently facing, as circular innovations are expected to breakthrough (Appendix 1.1 & 1.2).
The consumer becomes the supplier.
The research conducted in this report was initiated to explore, explain and define the impact of circular end-of-life systems on the linear fashion business model. In order to be able to outline the potential effects of accompanying circular systems to linear models, there first had to be looked at the key principles of both systems.

It became obvious that regardless of the economic success of the linear model, the way it operates can shortly no longer be sustained by the world's natural capital to the amount it requires. In the long run, this would consequently unable businesses to persevere growth, as the system is stuck in a vicious circle of exhaustion on one side and waste generation on the other. At the same time, it was stated that circular economy principles could unlock these negative externalities and resolve the linear economy’s wasteful impact. This system is built on the restoration and regeneration of renewable resources, and would ultimately close material loops with support of innovative systems, technologies, materials and business operations. Disregarding the positive expectations and predictions of the circular economy, the eventual outcome remains quite ideological and abstract as there is no proof from an economic standpoint nor available technologies and infrastructure yet.

As of now, transitioning towards a 100% circular economy thus seems far from possible neither realistic. However, a shift from continuous extraction to clever ways of handling what is in the system already would reduce waste and decrease dependency on- and exhaustion of resources. Various ways to get started were therefore extensively explored in the chapters two and three, outlining the potential and operation of circular end-of-life systems, strategies and solutions. Even though these systems are each executed differently, they ultimately come down to the same concern: preventing products from becoming waste at end-of-life by choosing responsible alternatives to landfill or incineration, among which material selection, repair, reuse and recycling efforts would become crucial focus points for businesses.

This would mean that all materials, components and products should be carefully disposed of in circular streams or collected back by businesses after consumption, if it was actual to become a circular alternative. In fact, end-of-life in circular systems would thus not be an end anymore, but the beginning of another useful journey.

Along the search for discoveries, it became clear that the impact of operating circular instead of linear at end-of-life, would be the post-consumer responsibility of businesses to safeguard products and materials. The effects would be centered around the initiation of effective take-back systems and development of a reverse network, which would require additional partnerships, channels, operating systems and a different approach to material sourcing and usage. High investments and commitment are inevitably necessarily to realize this, while the benefits in return are mostly long-term.

Another crucial consequence and essential contributor of circular end-of-life operations would be the consumer, as they will partially become the supplier for circular material input. Nevertheless at this moment, the majority of fashion consumers still seems highly unaware of their role. While the industry is facing difficulties in getting back appropriate volumes to scale up recycling, communication, information and strict guidelines about how consumers can dispose of their textiles are missing.

The completing step of this research will therefore be translated in a campaign to support the fashion industry in the collecting process, raise awareness and activate consumers to prevent textiles from becoming useless waste. Ultimately, when fashion can be part of a circular stream of materials, the industry could become more equally beneficial for businesses, the environment and society en masse.
Professional journals


Greenpeace (2016). Timeout for Fast Fashion


Raworth, K. (2012). A Safe and Just Space for Humanity: Can we live within the doughnut


Books

Websites


Conferences

Circular Minds Conference, TU Delft, 13/03/2018
Meet the Startups, Fashion For Good, 21/03/2018
Fashion Forward: Gamechangers, Circl, 05/04/2018
Fashion Revolution Week: Fashion Factories Undercover, 24/04/2018
1.1 Interview Gwen Cunningham, Circle Economy

1.2 Interview Annet Feenstra, H&M

1.3 Interview MUD Jeans, Bert van Son

1.4 Interview Suzanne Smulders, LENA the fashion library

1.5 Interview Joy Roeterdink, SuitSupply

1.6 Observation, Sales Associate at Samsøe & Samsøe