

**CIRCULAR FASHION**  
**- DEVELOPING SUSTAINABLE CLOTHING FROM LOCAL WASTE**

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**ABSTRACT**

Clothing and textiles contribute significantly to the global accumulation of waste. The circular economy has been proposed as a solution to adopt a more sustainable behaviour in the fashion industry by reusing and recycling discarded clothing items to minimize waste. This study looks at the potential of integrating local waste into supply chains to strengthen the sustainability of circular fashion business models. By using a qualitative research design based on a multiple-case study method, this study helps assessing the feasibility and desirability of local loops with the aim of driving the development of circular fashion in the Netherlands forward. The results show that closing loops locally could and should be attained with reusing activities. In terms of recycling, locality has a lower priority, as the high costs and lacking facilities in the Netherlands hinder the viability of such business models. The study concludes with a list of factors that are relevant to transition to a more sustainable Dutch fashion industry and emphasizes the need to consider transport and location when introducing circular solutions.

## INTRODUCTION

Waste presents one of the biggest environmental and public health challenges. Large volumes of waste are generated daily throughout the world, but especially in developing regions that lack the right systemic support and sustainable approaches (Letcher & Vallero, 2019). A significant contribution to the global accumulation of waste comes from clothing and textiles in general. According to recent industrial reports, 400 billion dollars' worth of clothing is wasted every year (Shirvanimoghaddam, Motamed, Ramakrishna, & Naebe, 2020). In fact, 73% of clothing currently ends up in landfills and only less than 1% is recycled into new clothing. Accordingly, landfilling clothing not only imposes significant costs on irreplaceable resources, but also on the economy (Moorhouse, 2020). The fashion industry in general is one of the most polluting ones to the environment (Pandit, Ahmed, Singha, & Shrivastava, 2020). Not only does it usually involve an extremely long and complicated supply chain, but it is also polluting in the sense of its immense water consumption and by using harsh chemicals during production (Jacometti, 2019). The phenomenon of "fast-fashion", which Jacometti (2019) describes as the massive demand of clothing at low prices, has shifted production oftentimes towards emerging and developing countries with low labour costs and workplace abuses. However, over the recent years, there has been an increased pressure on fashion companies to act more responsibly. These pressures are exerted by end consumers, non-governmental organisations, and the media with the aim of pushing companies to making every step of their chain more transparent and sustainable (Jacometti, 2019).

A proposed solution for being able to adopt sustainable behaviour in the fashion industry is the circular economy, which the European Commission (2015) defines as "maintaining the value of products, materials and resources for as long as possible by returning them into the product cycle at the end of their use, while minimising the generation of waste". The circular economy is an alternative draft to the linear economy, where production causes natural resources to

ultimately end up as waste (Murray, Skene, & Haynes, 2017). However, this linear model has proven to be problematic as resources are not infinite and need to be managed to sustain future generations (Murray et al., 2017). The circular economy aims to restore any damage caused by the linear system and simultaneously ensures that as little waste as possible is generated during production and in the life span of the products (Murray et al., 2017). This new construct enables companies to create and capture value- not only by preventing waste and lost resources but also by stimulating economic activity and consequently generating employment (Crocker, Saint, Chen, & Tong, 2018).

With regard to the fashion industry, the reuse or the recycling of discarded fashion items can reduce the environmental impact significantly compared to the purchase of new fashion products (Dissanayake & Sinha, 2012). It is claimed that waste prevention throughout the product life cycle and minimizing waste that ends up in landfills are two key elements for the fashion industry's transition to a circular economy. Nevertheless, the largest part of European textile waste is exported to other countries that are unable to deal with it (Jacometti, 2019). Literature has identified several barriers when it comes to the implementation of circular fashion in general, such as the design preconditions of garments or the unwillingness of consumers to recycle (Brismar, 2015a). However, little investigation on the potential of closing loops with local waste streams has been done so far. Past studies have concentrated on closing the loop in the fashion sector but overlooked where the waste comes from. Yet, for the development of truly sustainable fashion, "simply" creating closed loops is not enough (Brismar, 2015a). Local sourcing would not only prevent unnecessary transportation but also reduce the lead time and support developing countries and their waste management. Even though global loops are better than no loops at all, regional and especially local loops are to be preferred (Brismar, 2015a). The recent confrontation with the COVID-19 pandemic has further highlighted the vulnerability of global supply chains and the importance to build local

resilience (Sarkis, Cohen, Dewick, & Schröder, 2020). This research aims to explore the chances of generating clothing out of local waste streams. The guiding research question is: *How can the implementation of local waste streams strengthen the sustainability of circular fashion business models in the Netherlands?* To help understand the potential of integrating the local aspect into the process, this study looks at different actors in the Netherlands that could help push the development further. The focus on the Netherlands was chosen because the Dutch national government has defined a clear target to implement a circular economy by 2050 (Government of the Netherlands, 2021). Since the country already pursues the goal of circularity on a national level, it was considered to be a suitable setting for this study.

The study is of high importance to several actors that are connected to fashion and waste management as it explores how to prevent the industry from transitioning from one unsustainable model to the next. It is a forward-looking research that aims to explore the potential and feasibility of local loops. The following theoretical section reviews current literature on waste management and circular fashion, the barriers the model is facing today and the chances of local sustainability. Afterwards, in the methods section, the multiple-case study approach of the study is described, and the selected cases are introduced. In the result section, the findings of the study are discussed and checked for similarities and differences. The final conclusion acknowledges for limitations of the study and gives suggestions for future research.

## THEORY

### **The Problem of Waste**

The accumulation of waste presents an environmental, economic and social problem worldwide, as the volume of waste is growing even faster than the world's population (Wang, Shammass, & Hung, 2014). This is because waste generation is influenced by economic conditions, living standards, urbanization, and the population (Kawai & Tasaki, 2016). Accordingly, the management of waste is essential for providing sustainable and liveable cities in the future. To this day, landfilling is the most common method to eliminate waste in many countries which poses a threat to land and sea life. (Wang et al., 2014). The introduction of stricter environmental requirements and regulations on a global level aims to combat this polluting behaviour and make countries initiate strategies to handle their waste (Wang et al., 2014). In the European Union, member states must reduce the environmental and health impacts of waste with the aim of improving resource efficiency (European Parliament, 2008). However, the management of waste is also expensive and comprises 20-50% of municipal budgets. Consequently, it is essential to integrate systems that are not only sustainable and socially supported but also efficient (World Bank, 2019).

***Reference to Textiles.*** In the EU, an average of 11kg of textile waste is produced per person per year (European Environment Agency, 2021). According to the European Clothing Action Plan (ECAP), only 30-50% of these discarded textiles are collected in most households of western European countries. This number is even lower in big cities where there is less space for collection because of the numerous apartment buildings (ECAP, 2019). The textiles that are not collected end up in undifferentiated waste and are consequently transported to landfills or are burned in incinerators (Jacometti, 2019). Accordingly, many valuable resources are wasted. A lot of these clothing items could have either been sold at second-hand markets or

been recycled. It is urgent to develop a viable business case since EU member states are required to have a system in place for the separate collection of textiles by 2025 (ECAP, 2019).

***Waste Management in the Netherlands.*** In the Netherlands, the Municipal Council is responsible for the collection and separation of waste. According to the European Commission, the Netherlands had the highest circularity rate amongst the member states with 29% of the used material resources coming from recycled products in 2016 (Eurostat, 2019). Nevertheless, when looking at the annual generation of municipal waste per capita the Netherlands are, with an amount of 511kg, slightly above the EU average of 495kg per capita (Eurostat, 2018). With regard to textile waste, 45% of textiles are currently being collected separately from which 53% are reused and 33% are recycled (Afval Circulair, 2020). Even though this rate is relatively high considering the EU average of 30-50%, it is still far too low to allow a circular system today. There are several options to dispose of textiles in the Netherlands. Besides the underground textile containers, where the quality of the collected textile waste tends to be a problem (De Afvalspiegel, 2020) there also exist specific containers next to supermarkets and shopping centres. Additionally, charities and recycling companies collect used clothing several times a year and there is the option to donate clothing directly to thrift shops or leave them at municipal waste disposal stations (Rijksoverheid, 2021).

### **Textile Waste and Circular Fashion**

Nowadays, consumers are disposing of a higher volume of textiles than previous generations (Rathinamoorthy, 2020). When the clothing item is in poor physical condition, it is directly discarded into the trash. Along with the rise of fast fashion and cheap garments, the overall quality of clothing has decreased and hence also has the lifespan of single items (Rathinamoorthy, 2020). The purchasing behaviour of consumers is claimed to be directly linked to their disposal behaviour. However, the degree of convenience and the information

available about disposal options are suggested to be important determinants when it comes to the donation actions of consumers (Rathinamoorthy, 2020). In the following, the reuse culture and the recycling concept are reviewed as these are supposed to help reduce waste in landfill, turn down the production of virgin materials and energy consumption and create a smaller environmental footprint of the fashion industry (Sandin & Peters, 2018).

**Reuse.** The reuse culture has the potential to help increase the life of textiles as their disposal is delayed (Rathinamoorthy, 2020). Next to this avoided end-of-life scenario, reusing prevents the production of new products and is considered to be the most environmentally friendly waste prevention option (Fortuna & Diyamandoglu, 2017). Reusing has been defined as a “non-destructive process that finds a second or further use for end-of-first-life solid materials without a change of state” (Cooper & Gutowski, 2017: 1). As the production process of new textiles is unsustainable because it involves the use of toxic chemicals that harm the planet and also pose a threat to society, the reusing of materials could propose a valuable solution (Cooper & Gutowski, 2017).

**Recycling.** The recycling concept involves the technical reclaim of fibres and producing new products out of them (Rathinamoorthy, 2020). Recycling can be understood as either upcycling or downcycling. Upcycling refers to designing new pieces that hold higher value than the original items, for example a shirt made out of an old cloth (Brismar, 2015c). It is also referred to as the process of converting old and discarded materials into something useful and purposeful (Rathinamoorthy, 2020). Downcycling means reusing materials in such a way that the end use is less valuable than the original use, for example, damaged textiles being used for car seat stuffing (Brismar, 2015c). Downcycling also involves converting once valuable products into low-value raw materials (Rathinamoorthy, 2020). Whereas reusing usually means that items are donated to charity or second-hand shops, they are completely reprocessed for use in new textile products in the recycling activity (Shirvanimoghaddam et al., 2020). The process

of recycling can work with either pre- or post-consumer waste. Pre-consumer waste, also known as industry waste, is waste that has been generated throughout the manufacturing process and refers to raw materials that have not been used (Shirvanimoghaddam et al., 2020). In the textile industry, pre-consumer waste mainly involves spill material and leftovers from garment factories (Brismar, 2015c). Post-consumer waste refers to items that have been discarded by households after their service life, such as old clothing and beddings (Shirvanimoghaddam et al., 2020).

### **Barriers to Circular Fashion**

Nonetheless, certain barriers hinder the implementation of the circular economy in the fashion industry. First, there are several requirements regarding the condition of garments to enable a successful recycling process. Products, or certain components need to possess greater durability, modularity, and standardization. This means that design strategies need to increase the reusability of garments and hence will require additional material and ultimately also increase the initial impacts in production (Cooper & Gutowski, 2017). In order to push the development of circular fashion and the transition to sustainability, clothing needs to be designed “for prolonged existence, resource effectiveness, non-toxicity, biodegradability, reprocess and reusability, and good morals in mind” (Rathinamoorthy, 2020: 101). All in all, the current markets for recyclable textiles are still limited (Bukhari, Carrasco-Gallego, & Ponce-Cueto, 2018) and the sorting of textiles is very expensive and time and labour intensive (Blackburn, 2009).

Next to the recycling model, the concept of reusing is also facing several barriers. The process of donation usually means that textiles are collected locally and are afterwards transported to national collection sites. Thereafter, they are shipped to large international facilities and sorted into different fractions. Once the clothes have arrived in their new recipient country, there is



close to no control to determine their final destination (Brismar, 2015b). Many developing countries have officially banned the import of second-hand clothing as it presented a threat to the local garment industry. Only the top 10-20% of textiles are reused in European markets, the remainder is exported to developing countries (ECAP, 2018). In fact, more than 70% of used clothing globally has been sent to Africa (Kubania, 2015). This has severely disrupted the retail on site and encouraged a competitive garment industry (Bukhari et al., 2018). Money that was previously spent on domestically made clothing was, as incomes declined, spent on the cheaper, internationally imported goods and resulted in factories needing to close across the whole continent. As a result, profits flowed out of African economies to the commercial exporters and charities operating in the global North (Brooks, 2019). In the Netherlands alone, 84% of collected textiles are exported to other countries (Afval Circulair, 2020) which underlines the need to find national solutions, especially since the long transport routes through export could cancel out the environmental advantages of reusing (Sandin & Peters, 2018).

### **Chances of Local Sustainability**

The focus on the local dimension has been proposed as a way to achieve global sustainability. According to Albino and Kühtz (2004), global sustainability can only be reached by local actions and local economic development is attainable within the boundaries of sustainability. Smaller scale and locally adaptive solutions are claimed to have significantly less environmental impact than large scale global solutions (Murray et al., 2017) due to the proximity between production points and use (Ellen MacArthur Foundation, 2017). This proximity also allows the reduction or even avoidance of packaging, transport costs and transaction costs (Ghisellini, Cialani, & Ulgiati, 2016). This is because supply chains can be organised without having to cross borders and consequently the transport costs are significantly lower (Ellen MacArthur Foundation, 2017). Accordingly, next to the environmental aspect, the

production from local resources and for local needs is also the most rational way of economic life (Schumacher, 2011).

*Application to the Circular Economy.* The development of a circular economy based on local resources is seen as a way to strengthen the local economy and to create the possibility of self-sufficiency (Jay, 2015). Self-sufficiency is viewed as the effective management of resources that are necessary for survival and development (Buheji et al., 2020). The phenomenon has gained importance in face of the recent confrontation with the COVID-19 pandemic which drew attention to the interdependency and vulnerability of supply chains (Sarkis et al., 2020). The crisis has also severely disrupted waste streams and the trade of second-hand clothing worldwide (European Environment Agency, 2021). The experience of such pandemics and other global emergencies has given rise to the idea of transitioning to a new normal that builds nature-friendly economies that cannot be disrupted by such events (Buheji et al., 2020). A circular economy strategy is proposed to make effective use of natural resources and enhance local stock management (Jay, 2015). Closing loops locally leads to economic benefits, as trade balance and resource productivity is improved, social benefits, as regional jobs and ties are created, and environmental benefits, as there is limited pollution from transport and less new products that are being produced (Jay, 2015).

Even though local loops have not yet been explored much, there is evidence in the literature that they could indeed bring several advantages. A stronger closed-loop thinking could lead to societies taking responsibility for their own waste and ultimately increase their reusing and recycling behaviour (ECAP, 2018). Furthermore, having to deal with textile waste locally leads to the creation of local jobs and hence also social support (ECAP, 2018). It is important to think about long-term national solutions that prevent clothing items from being incinerated, especially as the global demand for used clothing might decline because of the saturation of the market (ECAP, 2018).

## **METHODOLOGY**

### **Research Methods**

This study employs a qualitative research design based on a multiple-case study method. The aim is to portray the current state of developing sustainable fashion from local waste and to explore the potential and the feasibility of local loops. Multiple cases of different actors in the fashion industry, the circular economy and the waste management field in the Netherlands were looked upon to obtain a broad perspective from different contexts. The qualitative understanding of each case permits studying the experience of real cases in real businesses and how they operate within their particular environment (Stake, 2013). Consequently, this approach aligns best with this study's aim to derive practical and feasible recommendations that help push the field of local circular fashion forward. Considering more than one case further allows to discover elements of convergence and divergence in the approaches of making local circular fashion happen. In sum, the multiple-case study is claimed to be suitable when aiming to compare and contrast findings derived from different cases and getting an impression about what is unique and common in the approaches (Bryman & Bell, 2015). Consequently, this method allows to examine different interpretations of happenings and how the core principles are adopted in different industries (Stake, 2013).

### **Data Collection**

For this study, different cases were selected to represent different sectors of activity that are relevant when introducing an all-encompassing system to close loops in the fashion industry in the future. Semi-structured interviews were conducted to collect case data as this type of interview allows to remain flexible and puts emphasis on the interviewee's understanding of certain issues (Bryman & Bell, 2015). Semi-structured interviews are especially appropriate in multiple-case studies as they allow cross-case comparability by covering all relevant research

areas and still remaining open to gain deeper understanding of the processes (Bryman & Bell, 2015). This was of high importance to uncover the necessary prerequisites for a transition to a model of local circular fashion. The selection criteria for the cases investigated in this study were: location, circularity approach and industry. All selected cases are situated in the Netherlands and play a critical role in making the transition to a circular economy in the textile industry possible. The following table portrays a short overview of the organizations that were included in this study.

**TABLE 1**  
**Overview of Organizations**

<b>Name</b>	<b>Description</b>
<b>Omrin</b>	Omrin is a Dutch waste management company that tries to combat the negative impacts of waste by developing a circular collection concept. In 2019, Omrin was not only the most circular collector and processor of domestic and industrial waste, but also the most sustainable company in the Netherlands (Omrin, 2021b).
<b>Reusing</b>	
<b>Estafette</b>	Estafette is an independent foundation that was brought into life by Omrin. They turn waste into reusable goods and sell them at their thrift stores (Omrin, 2021a).
<b>ReShare</b>	ReShare is a division of the Salvation Army, a non-profit organisation that operates globally to collect and distribute second-hand clothing. The collected clothing is sold in the ReShare stores, and all profits go to the Salvation Army (ReShare, 2021).

<b>Het Goed</b>	Het Goed is a Dutch franchise of 27 thrift department stores. Together with several partners, they are working on an inclusive and circular society (Het Goed, 2021).
<b>Recycling</b>	
<b>SaXcell BV</b>	SaXcell is the abbreviation of Saxion Cellulose and denotes an innovative fibre that is made from domestically discarded cotton. The regenerated virgin textile fibre is obtained through chemical recycling (SaXcell B.V., 2020).
<b>Blue LOOP Originals</b>	Blue LOOP Originals is a Dutch fashion brand that tries to create something new from used materials. The brand is specialised on recycled denim yarns (Blue LOOP Originals, 2021).
<b>Humanoid</b>	Humanoid is a sustainable Dutch fashion brand that also uses recycled materials. The brand works with local craftspeople and puts emphasis on transparent supply chains (Humanoid, 2021).
<b>Enschede Textielstad</b>	Enschede Textielstad is a weaving mill that produces garments and textiles from local and recycled yarns. With their local production, they help fashion companies become more transparent and sustainable (Enschede Textielstad, 2018).
<b>Networks/ Initiatives</b>	
<b>Circulair Friesland</b>	The Circulair Friesland association is an open network of circular pioneers that was founded by the Frisian Business Community in 2016. It is a collaboration between business, education and government with the aim of realising a circular economy (Circulair Friesland, 2021).

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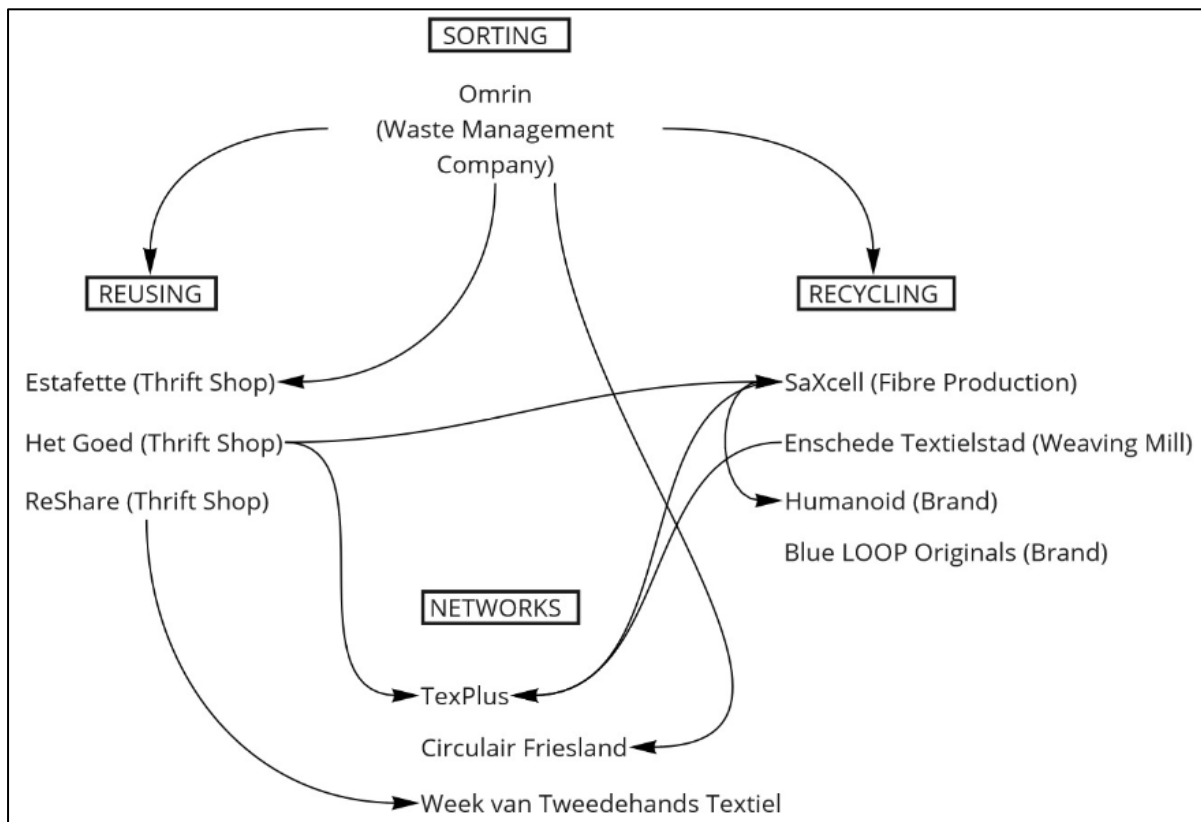
<b>TexPlus</b>	TexPlus is a partnership between leaders in the field of circular textiles that aims to link the chain from collection to reuse. They are actively involved in the development and application of recycled textiles (Texplus, 2021).
<b>Week van Tweedehands Textiel</b>	The Week Van Tweedehands Textiel is an initiative by the Salvation Army with the aim of motivating people in the Netherlands to donate and shop second-hand clothing (Week van Tweedehands Textiel, 2021).

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Most of the participants that were interviewed for this study are in some way interconnected. Figure 1 illustrates how the sorting, reusing and recycling sectors are already cooperating and forming networks. Omrin represents the waste management sector and provides textile waste for recycling and reusing activities. The company founded the non-profit organization Estafette and is part of the association Circulair Friesland. Het Goed is not only a thrift shop but also provides cotton waste for the fibre production firm SaXcell. Het Goed is, together with SaXcell and the weaving mill Enschede Textielstad, part of the network TexPlus where several companies are already trying to create a closed loop within the Netherlands. ReShare launched the Week van Tweedehands Textiel during which they are cooperating with many Dutch partners to spread awareness. Lastly, the sustainable fashion brand Humanoid sourced fabrics from SaXcell. Due to the interconnectedness of the interview partners, findings could be verified to increase the validity of this study.

**FIGURE 1**

**Interconnectedness of Organizations**



The companies were approached either by e-mail or by telephone. Before conducting the interview, each participant received an “Informed Consent” to ensure their voluntary involvement in the study and to agree on the terms and contents of the interview (Appendix A). The following table lists all the participants that were interviewed and includes the organizations in which they are active and their respective functions.

**TABLE 2**

**List of Participants**

<b>Company</b>	<b>Function</b>	<b>Date</b>
<b>I1</b> Estafette/ Omrin	Manager	20.04.2021

<b>I2</b>	Omrin	Raw Materials Manager	22.04.2021
<b>I3</b>		Director Sales & Logistic	
<b>I4</b>	Omrin/ Circulair Friesland	CEO	26.04.2021
<b>I5</b>	Enschede Textielstad/ TexPlus	Founder	05.05.2021
<b>I6</b>	ReShare/ Week Van Tweedehands Textiel	Marketing & Communication	06.05.2021
<b>I7</b>	Blue Loops Originals	Co-Founder	07.05.2021
<b>I8</b>	SaXcell/ TexPlus	Researcher Textile Technology	11.05.2021
<b>I9</b>	Humanoid	Textile Print Designer	12.05.2021
<b>I10</b>	Het Goed/ TexPlus	Manager Sustainability & Development	14.05.2021

The interviews were oriented on the guidelines of the Appreciative Inquiry (Ai), as this approach aims to construct the future through dialogue, innovation and action by focusing on accomplishments and ideals of the interviewees (Ludema, Cooperrider, & Barrett, 2006). The approach was considered appropriate as it is supposed to help gain more understanding and make useful contributions to developments (Reed, 2006). Furthermore, as the circular economy is still an emerging field, Ai can help to create hope for the future and to renew the interviewee's commitment to change (Michael, 2005). However, Ai is subject to a complex and well-regulated process that would not have been feasible in the scope of this study, especially since no structured interviews were conducted in order to remain flexible and open. Even though the approach was not fully applied, the questions posed were of a positive nature and focused on how potential barriers can be overcome. Additionally, all interviews dealt with locality, the Corona crisis, partnerships and hopes for the future in order to ensure comparability of the cases. An exemplary interview guide can be found in Appendix B.



## **Data Analysis**

The interviews lasted approximately 30 minutes each and were recorded, transcribed, and sent back to the participant for their approval before proceeding to the analysis of the data. The interviews were transcribed using the software Otter.ai and were thoroughly revised afterwards. The transcripts can be accessed [here](#). Following the transcription of all interviews, the data was coded with the software ATLAS.ti by applying the inductive coding approach. In the process, the data was continuously organized, compared and reviewed to assess the current stand and to give an outlook on local circular fashion in the Netherlands. In the last step, the emergent codes were categorized into different themes to be able to answer the research question and to draw conclusions (Appendix C). To ensure trustworthiness of the data and avoid bias, triangulation was done by additionally consulting secondary data that was collected by looking at the companies' websites.

## RESULTS

In the following section, the results of the multiple-case study are presented. In the first part, the current state of developing sustainable clothing from local waste in the Netherlands is described. The section is divided into waste streams, local loops and the influence of the Corona crisis. Afterwards, the most important factors that could push the field of circular fashion in the Netherlands forward are identified. The aim of the findings is to provide a comprehensive overview of the perceived barriers and chances from relevant actors in the field.

### **Current State of Circular Fashion in the Netherlands**

*Waste Streams.* All participants in this research observed the declining quality of textile waste whilst the amount of discarded textile is continuously rising. This poses a threat to reusing and recycling activities. There are several reasons for the low quality of textile waste. First, the cheap fast fashion goods that are imported mostly from Asian countries are made from synthetic fibres which were perceived not to be suitable for a prolonged existence. However, several interview partners also mentioned that the soiling of the collection containers causes the clothes to become heavily stained and wet and thus unsuitable for further use. *“People also learned that they could accidentally throw in a diaper or other filthy things in those textile containers. So, the quality went down”* (I7). Another reason for the declining quality of discarded textiles is that people start to realize the value of their used clothing and sell the items that are still in good condition via large retailers online. Therefore, only the low-quality clothes end up in the containers. According to I1, only 13% of donated clothing can be reused in their stores. The participants from the recycling sector confirmed that most clothes are also not suitable to be recycled. *“And quality has to be good. When you get shit in, then you also get shit out.”* (I2). Furthermore, innovative recycling activities become more expensive the lower the quality of the materials per kilo of textile waste purchased, I8 even stated that

“[...]the percentage of polyester could kill [their] business case.”. To increase the quality of the waste, the employees of Omrin highlighted that “*the way of collecting is important*” and suggested “*to dry collect*” because “*when it becomes wet you have to burn it.*” (I2).

**Local Loops.** There was a general agreement amongst the interview partners that closing loops locally would strengthen the sustainability of circular fashion business models. However, the priority and feasibility of these loops were perceived very differently. For example, I5 from Enschede Textielstad stated that “*locality is key*” whereas I8 from SaXcell claimed that “*locality has no priority at all*”. In general, locality seemed to play a more important role for participants from the reusing sector as there are less actors involved in the chain. However, there was no common understanding of what locality actually means and the participants distinguished between regional, national and European solutions when it comes to sustainable supply chains. Some participants suggested “*to try to keep as much as you can local*” (I6) and to incorporate “*as local production as possible*” (I5) when making decisions concerning the supply chain.

**TABLE 3**

**Advantages of Local Loops**

	<b>I1</b>	<b>I2 &amp; I3</b>	<b>I4</b>	<b>I5</b>	<b>I6</b>	<b>I7</b>	<b>I8</b>	<b>I9</b>	<b>I10</b>
Control		x	x			x		x	x
Convenience	x	x				x	x	x	x
Independence		x	x			x			
Job Creation	x		x		x				x
Time-efficiency			x	x					
Transparency		x	x	x				x	
Transport	x	x		x	x	x	x	x	x
Trust			x	x					

Several advantages and barriers of local loops could be detected during the interviews. The most prominent argument in favour of local loops was the reduced transport that comes with it

that leads to reduced CO2 emissions and increased time-efficiency. The proximity of actors within the chain reduces the environmental impact and allows direct contact to the different suppliers. Further opportunities lie in the independence from the global market that can be achieved by local supply chains. The participants valued the transparency and the control over the whole chain that can be more easily attained with local loops. *“And what you see is that the bigger you project the market, the more anonymous it gets. If you can do it in the in the region, people understand, people can see it, people if they want, they can visit it, and they can see what happens.”* (I4). In the circular economy, the loops should be *“big enough to make scale, but not too big to oversee the total chain”* (I3). Furthermore, closing loops within the Netherlands was considered to be the most convenient and logical choice to deal with textile waste because *“[...] why would it be smart to ship it?”* (I1). Lastly, the participants from the reusing sector in particular saw the advantage of creating jobs in the region.

**TABLE 4**

**Barriers of Local Loops**

	I1	I2 & I3	I4	I5	I6	I7	I8	I9	I10
Costs			x			x	x	x	
Demand	x				x		x		
Development Time			x					x	
Dissent	x			x					
Facilities				x			x	x	
Online Retailers	x	x			x				
Scale			x	x		x	x	x	x

Nevertheless, the participants also perceived several barriers that hinder the implementation of a local fashion industry in the Netherlands. The problem of scale was mentioned by most of the interviewees, especially when it comes to the production of clothing. *“Of course, on a bigger scale, it's kind of hard to work here in Holland [...] So, of course, we would like to have it close by home, but it's not possible.”* (I9). Two participants also mentioned the long

development time of a closed loop within the Netherlands that slows down the progress. Moreover, as mentioned above, the relevance and meaning of locality was assessed differently because “[...]not everybody thinks the same about this problem.” (I1). The missing facilities to close the entire chain within the Netherlands are an important factor as well. I8 mentioned, for instance, the necessity to have yarn spinning facilities next to weaving mills to really be able to close loops locally. Especially from the brand perspective the missing facilities, the small scale and the expensive yarns are hindering the implementation. *“But if you have shipped the whole industry to other parts of the world, you can talk about circular economy, but then you also need to be honest and say: Okay, this circle economy is not a Dutch thing.”* (I7). To tackle this problem, I8 suggests Dutch solutions *“on small scale, for quick response, also for designing new technologies and new production strategies”* but to cut reshoring on a large, industry scale for reasons of profitability and feasibility.

With regard to reusing, international online retailers that gained popularity over the recent past could present a threat to national collection and reusing activities as people recognize the value of their used clothing and consequently donate less. In addition, the large amount of textile waste combined with a rather low demand for second-hand clothing is a barrier to closing the loop entirely through reusing within the Netherlands.

***Impact of COVID-19.*** The participants of this study perceived the effects of the Corona Crisis quite differently. In the reusing sector, the interviewees reported a decline in the quantity of waste as people bought less clothes during the pandemic. I6 from ReShare also mentioned that they *“couldn't ship [their] really big supplies to [their] partners abroad, outside of the Netherlands”* and consequently needed to find national solutions to deal with the textile waste. Additionally, it was mentioned that they *“have to invest more in and being more present online”* to be able to compete with large second-hand retailers. The impact of the crisis affected the brands that operate with recycled materials differently. I9 stated *“when COVID hit us, it*

*was really visible*” whereas I7 could not feel the effects of the pandemic so much. Furthermore, the participants reported the rising prices of garments and also that *“you cannot rely on another continent in times of crisis, because when really time is of the essence, then you cannot afford to wait for a ship to arrive with your goods.”* (I5). According to I4, the crisis highlighted the overall dependency on the global market and revealed the chances of more national solutions to continuously keep supply chains running.

### **Factors to Push Local Circular Fashion Forward**

As this is a forward-looking study, the aim is to detect factors that would allow the transition to a local circular fashion industry in the Netherlands. Table 2 summarizes the most prominent chances that the participants perceived to enable the future of such an industry.

**TABLE 5**

#### **Factors to Push Local Circular Fashion**

<b>Chances</b>	<b>Frequency</b>	<b>Examples</b>
<b>Awareness</b>	12	<i>“I want it to be a really well-known thing. [...]And it really, it makes people think and maybe even change their behavior.”</i> (I6)
<b>Collaboration</b>	16	<i>“Your whole supply chain, without some decent partners, cannot work.”</i> (I7)
<b>Communication</b>	6	<i>“[...] we have to do way better communication.”</i> (I1)
<b>Collection Method</b>	8	<i>“If people donate it while you're going door to door or if people donate it to our store the quality is much better.”</i> (I1)

<b>Design</b>	9	<i>“And the problem begins at the start of the story. And that's where I think should be made a lot of changes to solve this problem.” (I6)</i>
<b>Preconditions</b>		
<b>Education</b>	13	<i>“And it starts with educating people [...]So that's one big campaign that we're launching, that people are educated about textile recycling.” (I5)</i>
<b>Extended Producer Responsibility (EPR)</b>	12	<i>“The producers are responsible for their own collecting, their own recycling achievements of their produced textiles.” (I3)</i>
<b>Global Solutions, Local Implementation</b>	9	<i>“The main goal is that you got global solutions, although you can make that local. So, the nice thing is that every country can recycle their old materials.” (I2)</i>
<b>Government/ Law</b>	13	<i>“And when the government sets targets, on recyclability, then you see that things are going to change. [...]it's really hard to change it without the government regulation.” (I4)</i>
<b>Mindshift</b>	14	<i>“I think that it starts always with public opinion. As long as all the people keep buying at low prices [...] it's really hard to change it [...].It should be a mindshift [...]. Then you will see that the shift towards a better world will increase, increase and increase.” (I4)</i>
<b>Store Design</b>	4	<i>“That we look more like regular shops and not at thrift shops of the old meaning of thrift shops. It's full of trash and it smells not so very good.” (I10)</i>

Raising awareness was an overarching theme that applies to all the different sectors. It refers not only to the importance of recycling but also to making consumers aware of the quality of clothes and what sustainability and locality entails. Connected to raising awareness is the factor of providing education. Young people and upcoming designers in particular play a crucial role in making the transition happen and need to learn about the importance of recycling. I7 suggested *“that the shop is also education point”* and the founder of Enschede Textielstad tries to educate the customers so that they can forward the message to the end-users.

A critical issue emerging in almost all interviews was the EPR which is expected to help with the landfilling of clothing as the producers of textiles are held responsible for their final destination. This factor is connected to the design preconditions of garments. I1 suggested to *“print the material label in the clothes”* so that they can be reused and recycled more easily. I3 further recommended to *“read where the textile continues to wear out”* to *“prevent that it's garbage”*. Furthermore, the participants agreed that government regulations are necessary to oblige producers to use recycled materials in their products and to increase the quality of textiles in general. The co-founder of Blue LOOP also mentioned that *“policymakers need to free up money”* to support the development of the field.

Increasing the transparency of business operations and supply chains can help businesses to build *“the attitude to learn from each other”* (I3) and makes it possible for consumers to *“trust the marketing message”* (I4) of companies. A further driver for the implementation of a circular fashion industry in the Netherlands is communication. There is the need to be open about the companies' activities and mission because if *“you lack the ability to commit to communicate it good to the market [...] you might end up with a very short history”* (I4). Furthermore,



participants viewed global solutions that are implemented locally as a desirable outcome for the future as it allows a transition on a large scale coupled with activities on a national level. I5 was convinced that *“if we can make it possible, then it can happen all over the world”*.

Almost all participants that were included in this study are also part of networks that emerged in the Netherlands or have different partners with whom they try to realize their circularity goals. These associations are crucial for closing the loop and allow combining different expertise to find innovative solutions together. All participants believed in the power of collaboration and network innovation to develop new solutions that push the industry forward because *“if you want movement, [...]you can never do it alone”* (I4).

## DISCUSSION

### Conclusion

The aim of the present research was to portray the current state of developing sustainable fashion from local waste and to explore the potential and the feasibility of local loops. The findings show that all participants agree that integrating the local factor into supply chains would strengthen the sustainability of Dutch circular fashion business models. Closing loops locally offers multiple environmental benefits by avoiding unnecessary transport and preventing domestic textile waste from being landfilled or incinerated. Nevertheless, this says little about how advisable and reasonable a change to a local circular economy would be in the Netherlands. Findings indicate that the priority of locality varies depending on the context and the situation. The implementation of a local fashion industry also differs between the recycling and the reusing industry. The collecting, sorting and reusing of clothing can be facilitated more easily locally compared to the new production of clothing from recycled materials. This can be attributed to the current lack of both adequate facilities and scalable solutions in the Netherlands. The findings suggest, however, that in general, actors connected to circular fashion try to operate as locally as possible.

As confirmed by the European Commission (Eurostat, 2019) the Netherlands are a forerunner when it comes to the circular economy and there are many initiatives sprouting all over the country. Even though the circular shift is underway, there currently does not seem to exist a common strategy on how to approach circular fashion and different parties work on the transition individually or only within their region. This may also be due to the fact that there is no unanimity on what an optimal circular economy should look like. Nevertheless, stakeholders in this study believe in partnerships to advance the development of the field. Since collaboration by joining forces is claimed to allow sharing knowledge and expertise and thus

helps with developing innovative solutions (Boiten, Li-Chou Han, & Tyler, 2017) it will most likely also present an important determinant for the trajectory of circular fashion in the Netherlands. There also was a high degree of convergence on the long-term goal of achieving a completely circular economy in which there is no more waste. All in all, it can be said that even though some approaches might differ when it comes to the realization of a circular fashion industry within the Netherlands, all partners work towards the same goal.

These results add to the rapidly expanding field of the circular economy. In the Netherlands in particular, a lot of effort is being made to transition to circular solutions. The origin of textile waste and its transport routes are important indicators for the sustainability of circular business models and should be taken into account by actors in the sector. The appreciative approach of this study allowed it to focus on how barriers can be overcome and thus generated valuable ideas from practitioners on how to design the future of circular fashion in the Netherlands.

## **Recommendation**

**Reusing.** Reusing can be considered the most sustainable way to deal with textile waste as there is a smaller number of actors involved in the supply chain. This results in a positive environmental impact and a lower dependence on the global market, especially considering the abundant amount of textile waste within the Netherlands. This finding is consistent with that of Sandin and Peters (2018) claiming that reusing is more beneficial than recycling. However, as discussed in the results section, there are certain barriers that currently hinder the implementation of reusing in the Netherlands. The quality of waste was found to be the biggest threat. To overcome this barrier and to ensure a better quality of textile waste, the right collection method is of high importance. Personal collection, or collection points in store allow to dry collect clothing and can also increase the donating behaviour of consumers. Raising awareness about giving clothing a second life and educating customers through personal

contact can help changing the mindset of people. Furthermore, second-hand clothing should be handled carefully to create thrift shops that resemble normal clothing stores so that customers have a positive shopping experience. Knowing about the textiles' final destination can also incentivise people to donate more of their used clothing. Greater efforts are needed to strengthen the online presence of second-hand retailers so that they are able to compete with global companies who increasingly recognize the potential of used goods (Ekström & Salomonson, 2014). As the Corona crisis led to people buying less but reselling more clothes, Dutch thrift shops should think about creating web shops as well to be able to stand the test of time. It is also important to find the right balance between supporting people to sell their used clothes individually and donating them to collection points. Given that all of the thrift shops included in this study are non-profit organizations that work for the good cause it is important that they learn to co-exist next to the global players. All things considered, it can be said that closing loops locally through reusing is something that could and should be achieved within the Netherlands and would lead to more sustainable business models. Continued efforts are needed to make reusing the first option to deal with clothing after usage.

**Recycling.** Unlike the reusing of clothing, recycling has a longer and more complicated supply chain. The participants disagreed about the priority of locality, however, after having analysed the transcripts, it can be said that closing the loop entirely within the Netherlands through recycling is neither feasible nor advisable today. Wage payments are in principle cheaper outside Europe (Nørup, Pihl, Damgaard, & Scheutz, 2019) which is why innovative solutions to reduce production costs domestically are necessary to achieve closed loops. Also, there are not enough facilities in the Netherlands to fill an entire supply chain, the solutions are not scalable, and it is too expensive to realise at the moment. As the Netherlands have a service economy (O'Neill, 2021) there is not enough industrial capabilities and expertise to facilitate such a local chain. Instead, the Netherlands should try to develop innovations that they can sell

and share globally. Also, it is important to build the necessary plants close to each other so that transport during production can be reduced. There is the urgent need to develop new solutions to reclaim fibres and many actors in the Netherlands are working on it already. However, it would be advisable to form national partnerships instead of the many small initiatives that try to work on solutions independently. The findings suggest that large scale solutions are only feasible internationally whereas closing loops within the Netherlands should be for quick responses and small-scale solutions.

In reference back to the research question it can be said that although local cycles are more sustainable, their feasibility and desirability is still debatable. In the reusing sector, the local aspect seems to have a generally higher relevance in the Netherlands. In principle, however, when thinking about circular solutions, it is important to take location and transport routes more strongly into consideration in the future.

### **Limitations and Future Research**

Even though this study included various actors from different sectors, the group of participants was still too small to be able to generalise the outcomes. In line with the appreciative approach, only Dutch actors that already try to make the circular model work were considered. Although this method was important to fulfil the aim of this study, it is also associated with certain limitations. As a result, two important actors that exert a significant impact on the trajectory of circular fashion in the Netherlands could not be included- the government, and international online retailers for used and recycled clothing.

Furthermore, since the Netherlands are perceived to be a forerunner in their attempt to achieve a circular economy, it would be interesting to conduct a similar study in a different country. Given that many participants recognized the opportunity of finding global solutions that can be applied locally, conducting a similar research in another country would show how the practices

can actually be implemented elsewhere. Although there exist a number of Scandinavian studies on the life cycle of used clothing already (Nørup et al., 2019; Schmidt, 2016; Watson, Palm, Brix, Amstrup, Syversen, & Nielsen, 2016), it is important to consider the non-European context accordingly. Along with this, there is an urgent need to be able to determine the final destination of used textiles from the Netherlands. Currently, there is little information on what happens to textiles after they reach the sorting centres (Brismar, 2015b). For circular fashion business models to be truly sustainable, however, it is necessary to consider the entire supply chain and include the origin and destination of the textile waste as well.

Finally, since this research was conducted over a relatively short time-frame, a longitudinal study that observes how the entire chain interacts to close the loop would further help to verify the findings. The relevance of such a study is underlined by the fact that all participants stressed the importance of partnerships and the inclusion of the whole cycle to transition to a circular fashion industry in the Netherlands.

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## APPENDIX

### A. Informed Consent



#### Informed Consent

##### Title of Research:

**Circular Fashion- Developing sustainable clothing from local waste streams**

##### Contact Information:

Nadja Winkel (n.winkel.1@student.rug.nl)

##### Institutional Contacts:

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Johannes van Polen (J.van.Polen@rug.nl)

The interviewer explains the following to the interviewee:

##### 1. Introduction and purpose of the study:

This study is conducted for the Sustainable Entrepreneurship Project (SEP) as part of the master's programme "Sustainable entrepreneurship" and revolves around the research question: **How can the implementation of local waste streams strengthen the sustainability of circular fashion business models in the Netherlands?**

It is a forward-looking research that aims to explore the potential and feasibility of local loops and how the development of the circular economy in the fashion industry can be pushed further. This is a qualitative study that looks at different cases in the Netherlands to generate new inputs.

##### 2. Goal of the interview

The main goal of this study is to acquire data from several actors which the investigator will analyse and use for academic purposes.

##### 3. Voluntary participation

The decision to participate in this study is completely voluntary. You may withdraw from participation until the 18th of April at the latest without justification or negative consequences.

##### 4. Right to decline answering particular questions

You have the right to decline answering particular questions without justification.

Recordings and transcription

The interview conducted will be recorded and transcribed afterwards. Information gathered from the interview will be analysed by the investigator.

6. Approval of transcription

The transcript of the interview will be sent to you to correct, review and approve it. You may request adjustments to the transcript. When the report is finished you and the other interviewed companies will also receive a copy via email. If you wish to stay anonymous to the other companies, you have the right to remain anonymous in their copies.

7. Interview data access

The data collected during the interview will only be accessible to the investigator and institutional contacts. Results of the study may be shared with other students and other interviewees.

8. Possibility to anonymise the interviewee

You may request not to be mentioned by name and request for anonymisation. If so, your personal information will not be used within the research and you and your organisation will not be traceable.

9. Quoting

The primary interviewer is allowed to quote directly from the original transcript.

I consent to be quoted verbatim:  Yes  No

I voluntarily agree to participate in this research.

Yes  No

I would like to remain anonymous within the research.

Yes  No

I understand that I will be given a copy of this signed Consent Form.

I hereby consent with the statements above:

Date:	Name of Participant:	Signature Participant:

The principal investigator hereby agrees to follow the agreed upon consent:

Date:	Name of Interviewer:	Signature Interviewer:
01.03.2020	Nadja Winkel	<i>N. Winkel</i>

## **B. Interview Guide - Estafette**

### Introduction:

- Thanks for participation
- aim of the study: forward looking research, explore chances of integrating the local aspect into circular fashion business models in the Netherlands
- goal of the interview: Estafette as part of the waste management company Omrin that tries to promote reuse and repurposing → direct link to local waste already given
- interview will be recorded and transcribed for academic purposes
- interview is confidential and will be transcribed
  - Did you receive and agree to the informed consent?
- Do you have any further questions?

### Opening Questions

- What do you value most about your company?
- What do you like most about your job?
- What are the unique aspects of Estafette in comparison to comparable companies?
- What do you consider to be your biggest achievement so far?

### Questions related to local textile waste management

- Many developing countries have introduced import bans for second-hand clothing as it threatened the garment industry on site. Did this play a role in the founding of Estafette as well? How do you contribute to overcome this barrier to the reuse of clothing?
- Why do you think local loops are important?
- What advantages do you see in the reuse of clothing in comparison to recycling or other sustainable options?
- How do you perceive the quality and quantity of the waste?
  - What options to deal with it are currently feasible?
  - What opportunities exist to operate on a larger (more national) scale?
- Oftentimes, the materials of textiles are not suitable for a prolonged existence. How do you think this barrier can be overcome?
- What has the Corona crisis taught you? How did it change your perception of local solutions?

### Questions related to the Dutch consumer/ market

- What do you value most about the Dutch fashion industry?
- What chances do you see in the Dutch consumer/ the Dutch market? Why is it a suitable setting for transitioning to local loops?
- Why do you think truly sustainable fashion business models in the Netherlands are feasible?
- Can you tell me about the DIY loop in Harlingen?
- What was the idea behind the Recycled Goods Cupboards?
- What was your main learning from it?



### Questions related to partnerships

- On your website you are listing several partners. What partnerships do you value most? What role do they play in making the circular model work?
- Can you tell me a little bit about your partnership with Omrin?
- What are your most critical learnings? What implications could you derive for future partnerships?

### Outlook Questions

- From your point of view, what are the most important factors and relevant actors to facilitate the transition to local loops?
- How do you see the future of the fashion industry in the Netherlands?
- What is your long-term goal?
- What are the three most important hopes you have to heighten the vitality of Estafette in the future?

## C. Coding Tree

