HEC MONTRÉAL

Fast Fashion: Do Recycling and Reusing Allow its Sustainability?

par

Kaileigh Hamilton-Browne

Mario Samano

HEC Montréal

Directeur de recherche

Sciences de la gestion
(Spécialisation Gestion de l'innovation sociale)

Mémoire présenté en vue de l'obtention
du grade de maîtrise ès sciences en gestion
(M. Sc.)

Décembre 2021

HEC MONTRÉAL

Retrait d’une ou des pages pouvant contenir des renseignements personnels

Résumé

L'objectif de cette recherche est de décrire et d'évaluer les différentes alternatives de vêtements à l'ère de la mode éphémère. Une revue de la littérature a permis de comprendre la fabrication des vêtements, la forte demande de vêtements et les différents scénarios de fin de vie du vêtement, en se concentrant sur recyclage et la revente. Des entretiens semi-dirigés ont été menés avec des experts de différents domaines, dont la revente de vêtements, du recyclage des textiles, de la gestion des matières résiduelles et de l'industrie de la mode. Celles-ci ont permis de compléter la revue de littérature et de fournir une analyse approfondie des différents scénarios et de leur impact sur la pérennité de la mode éphémère.

Sur la base de cette recherche, le recyclage et la revente de vêtements ne soutiennent pas la Fast Fashion. L'exigence de revoir la conception et les matériaux des vêtements pendant la fabrication et les impacts de la circularité textile, et de s'attaquer à la demande pour ces vêtements constituent une menace pour la viabilité de la mode rapide. Prendre des décisions stratégiques plus responsables et apporter de telles transformations à l'industrie auront un impact considérable sur les fondements de celle-ci.

Mots clés: Mode éphémère, Recyclage de textile, vêtement seconde main, Demande de vêtements, Éco-conception, Circularité textile

Méthodes de recherche: Recherche qualitative : revue de littérature et entrevues semi-dirigés

Abstract

The objective of this research is to describe and evaluate the different alternatives for clothes in the Fast Fashion era. There literature review explored the manufacturing of clothes, the high demand for clothes and the various scenarios for the garment's end of life in the recycling and resale realms. Semi-directed interviews were conducted with experts from different fields, including clothing resale, textile recycling, waste management and the fashion industry. These allowed to complete the literature review and provide an in-depth analysis of the different scenarios and their impact on the sustainability of Fast Fashion.

Based on this research, the recycling and resale of clothes do not sustain Fast Fashion. The requirement to review the design and materials of clothes during manufacturing, the impacts of textile circularity, and to tackle the demand for these clothes pose a threat to the viability of Fast Fashion. Taking more responsible strategic decisions and bringing such transformations to the industry will heavily impact its foundation.

Keywords: Fast fashion, Textile recycling, second-hand clothing, Clothing demand, Eco-conception, Textile circularity

Research methods: Qualitative research: literature review and semi-direct interviews

Table of Contents

List of Tables and Figures

List of Abbreviations

UNFA United Nations Fashion Alliance

CMT Cut, Make, Trim

PTFE Polytetrafluoroethylene

OOTD Outfit of the day

LCA Life Cycle Assessment

GWP Global warming potential

ESG Environment, Social and Governance

SASB Sustainability Accounting Standards Board

GRI Global Reporting Initiative

TCFD Task Force on Climate-related Financial Disclosures

CDPQ Caisse de Dépôts et Placements du Québec

CFDA Council of Fashion Designers of America

QR Quick Response

EPR Extended Producer Responsibility

RFID Radio Frequency Identification

CRM Customer Relationship Management

Acknowledgements

First and foremost, I would like to thank my research director, Mario Samano, for his guidance and commitment throughout this whole process. Thank you for challenging all the ideas I brought up to make sure I pushed them to the very end.

J'aimerais ensuite remercier toutes les personnes qui ont accepté de faire partie de cette recherche. Vous avez été ouverts, passionnés et surtout, prêts à partager vos maintes connaissances. J'ai hâte de voir la suite de vos projets et de vos parcours.

Lastly, I would like to thank my parents (even if 'thank you' doesn't even start to cover it) for the immense support they have provided throughout every endeavour I have taken on… I wouldn't be here without you guys.

Introduction

Within days or weeks of being spotted on luxurious catwalks, designs and garments are available in stores at an affordable price. This phenomenon known as “fast fashion” was born in the 1990’s. It is characterized by the shortened cycle of brands’ collections; it takes two weeks for Zara, and it takes eight weeks for H&M to get their collections to store (Claudio, 2007). This rapid response allows brands to cater to consumers who are looking to acquire new trends seen on various platforms.

Over the years, the consumers’ perception of their own wardrobe has changed. After wearing a garment a few times, consumers see their wardrobe as invaluable and disposable. A recent survey revealed that 33% of female participants consider their clothes old after wearing them only three times (Buzzo & Abreu, 2018). Indeed, fast fashion has shortened the lifespan of clothes, contributing to an extremely high consumer demand. This translates into approximately 80 billion pieces of new clothing bought annually worldwide (Bick et al., 2018). Currently, the global clothing consumption accounts for more than 2% of the world’s Gross Domestic Product (GDP) (Shirvanimoghaddam et al, 2020).

As wardrobes continue to be upgraded, it is important to understand the impact of clothing obsolescence on the environment. Negative impacts are felt across the supply chain, from its manufacturing to its disposal. The United Nations Fashion Alliance (UNFA) estimates the clothing and textile industry is responsible for 8-10% of the world’s greenhouse gas emissions, more than the emissions produced by air and maritime shipping combined. The UNFA also estimates that an average of “$500 billion of value is lost every year due to clothing underutilisation and lack of recycling”, highlighting the potential of this industry (UN Alliance for Sustainable Fashion).

The opportunity to capitalize on the underutilization of clothes has captured the attention of many different stakeholders of the ecosystem. Companies such as Patagonia, Levi’s and Acteryx have created programs to buy back or recycle their clothes. On the other

hand, third parties like Depop and Poshmark have disrupted the industry by creating online platforms to encourage and to connect consumers who want to sell and buy second-hand clothes. Going beyond business' corporate responsibility and strategy, governing bodies are also starting to incorporate textile recycling as a pillar of sustainable plans. Indeed, the City of Montreal published a Climate Plan to reach carbon neutrality by 2050. Included in the 46 actions published in this plan was the commitment to encourage donation and valorisation of textiles at the end of their lifecycle (Ville de Montréal, 2020).

The goal of this paper is to analyze the sustainability of fast fashion with clothing recycling and resale. The first section of this paper will provide an overview of the clothes, including its manufacturing, fibers, and textiles. The second section will tackle the demand for clothes and some of causes will be explored, including the impact of social media and the shorter lifespan of clothes. Lastly, this section will review different stakeholders and models in the recycling and resale industries. This will help map out the different processes, cost structure and benefits of each alternative.

The second section of this paper will review business cases and qualitative research. By gathering knowledge from different experts and business landscapes, an analysis of business cases and business models will help evaluate the impacts on the industry. This analysis is divided into three main themes: the manufacturing of the clothing, the demand for clothing and the disposal and alternatives for the clothing. This analysis will help answer the research question: Can recycling and reselling sustain the fast fashion industry? This paper will also provide insights, industry implications and limits associated with the research question.

Chapter 1
Context and Industry Challenges

1.1 Pre-consumer waste

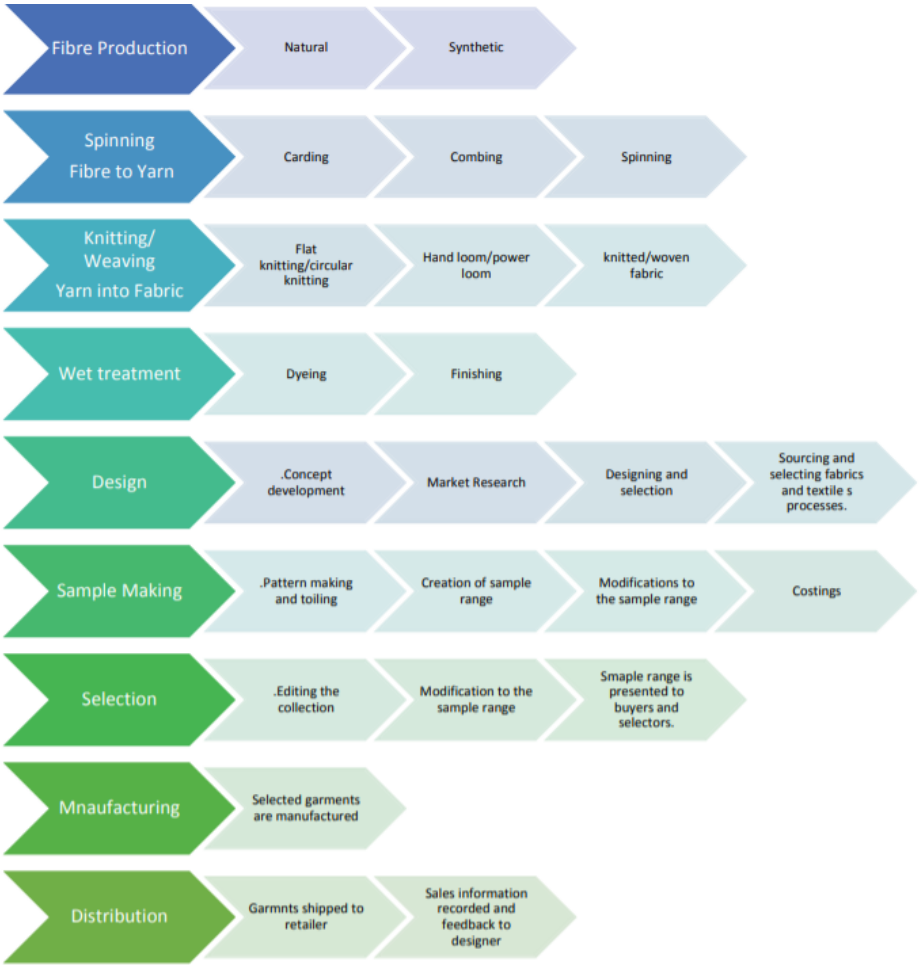
Waste related to the clothing industry can be found throughout the entire supply chain and is divided into two main categories: pre-consumer and post-consumer. Pre-consumer waste is related to any activities prior to the garment being handed over to the consumer that encompasses different phases such as the manufacturing and distribution.

1.1.1 Manufacturing

During the garment manufacturing phase, one of the steps is cutting the pattern out of the fabric. This is called the 'cut, make, trim' (CMT) process and can represent up to 15% of overall fabric waste. This 15% of fabric can end up in landfills, in bodies of water or can be incinerated. This also means the water, energy, pesticides (for cotton) or oil extraction (for synthetics) used in this 15% of fabric was wasted (Joshi & Chowdhury, 2021). As seen in Figure 1, a portion of all the resources needed from the 'Fiber Production' phase to the 'Manufacturing' phase were wasted.

What is key to highlight is that the fabric waste from this process is often made up of smaller pieces and in unusual shapes since it has been trimmed off to match the pattern. This makes it difficult to offer a second life to this fabric waste, other than disposal (Joshi & Chowdhury, 2021).

Figure 1 Activities of the supply chain (Joshi & Chowdhury, 2021)



Note i: Process for manufacturing, starting with the very first step of raw material extraction to the last step of distribution to retailors.
Note ii: For the 8th step, it should be read 'Manufacturing'

1.1.2 Fibers used

The fibers used in clothing manufacturing can be broken down into three main categories: plastic-based fibers, cellulose-based fibers and protein-based fibers (Ellen MacArthur Foundation). The Ellen MacArthur Foundation published an extensive report entitled: 'A New Textiles Economy: Redesigning Fashion's Future', which includes a detailed section on fibers. It is key to understand the differences between the three groups to better

understand their impacts on the environment, their respective markets and their possibilities for their disposal.

Plastic-based fibers

Plastic-based fibers represent close to two thirds of all fibers in textile production and are made from oil. Examples of synthetic fibers include polyester, nylon and acrylic, which account for 55%, 5% and 2% respectively of the total use of synthetic fibers. Though these fibers do not require much water or land for production, they do rely heavily on oil. Since they are plastic, they are not biodegradable and remain in land and bodies of water for a very long term; every time a garment is washed, plastic is released into water sources. It is estimated that 500,000 tonnes of plastic microfibers are released into our oceans each year from household washing machines (Ellen MacArthur Foundation).

Cellulose-based fibers

Cotton, viscose, lyocell, linen and hemp are some examples of cellulose-based fibers. These types of fibers represent close to a third of all fibers used in textiles. The raw materials used in these fibers can either be extracted directly from the plant, such as cotton, or can be extracted through a chemical treatment called cellulose. Though these fibers are typically biodegradable, they do require immense amounts of water, fertilizer, chemicals, and energy during their production (Ellen MacArthur Foundation).

Protein-based fibers

These types of fibers represent only 2% of all fibers used in textiles. Most protein-based fibers used are wool and then silk. Since animals are used in the production, methane emissions are an important pollutant from wool. Silkworm culture is also very carbon-intensive and requires a lot of labour to produce silk. However, these two fibers are biodegradable, and wool is recycle-friendly due to its long fibers (Ellen MacArthur Foundation).

1.1.3 Textiles

To keep up with the fast pace of fast fashion and to sustain lower prices, there has been a shift in the composition of textiles. Between the 1930's and 1970's, there was the rise of synthetic fibers, a result of innovation in the textile industry. These new fibers include nylon, polytetrafluoroethylene **(**PTFE), polyester, spandex, and kevlar. These fibers have increasingly demonstrated optimized properties and durability and can be woven in a very similar way to natural fibers (Kadolph & Marcketti, 2017).

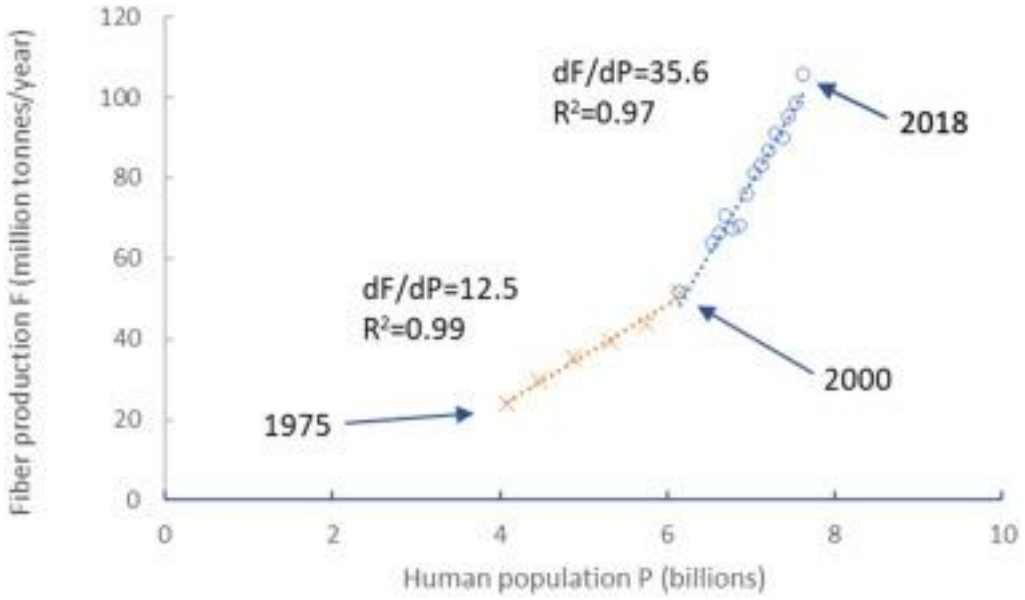
A mixed blend fabric is a fabric made of both natural fibers and synthetic fibers. Nowadays, companies have shifted increasingly towards mixed fabric blends; an estimated 69% of textiles are now plastic-based (Chen et al., 2021). If the trend continues, the industry will account for 26% of the carbon budget (Ellen MacArthur Foundation).

1.2 Post-consumer waste

1.2.1 The Quantity of Clothes

As previously stated, the consumption of clothes has grown exponentially; this can be seen through the production of fibres throughout the years (Figure 2). The global production of fibres increased 82%, passing from 7.6 kg /person in 1995 to 13.8 kg/person in 2018 (Peters et al., 2021). The United Nations Alliance for Sustainable Fashion estimates that on average, consumers across the globe are buying 60% more clothes than they were 15 years ago but are keeping them for half as much time (United Nations Environment Program, 2019).

Figure 2 Fibre production by human population (Peters et al., 2021)



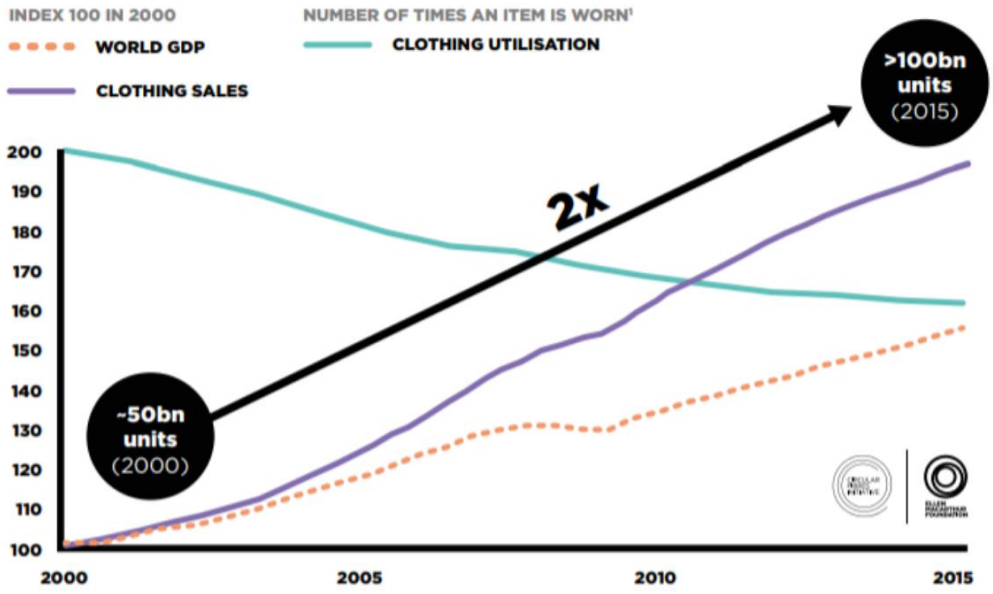
Note: The figure expresses the fibre production increase that evolves faster than the growth of human population.

The Demand

The value attributed to clothing has changed, contributing to its disposability. After wearing a garment a few times, consumers see their wardrobe as invaluable and disposable. Therefore, in the era of fast fashion, the lifespan of clothes has shortened, contributing to an extremely high consumer turnover and demand. This translates into approximately 80 billion pieces of new clothing that are bought globally every year (Buzzo & Abreu, 2018). This growth in demand versus the underutilization of clothes can be seen in Figure 3 below.

The global consumption of clothing is double the amount consumed 20 years ago (Shirvanimoghaddam et al, 2020). During that same time frame, the population had only increased by 25% (Roser et al., 2013). Indeed, different factors increase the demand for clothing and two of them will be considered in the following pages.

Figure 3 Growth of clothing sales and decline in clothing utilisation since 2000 (Ellen MacArthur Foundation)



Note: The figure expresses the increase in sales of clothing and decrease of its utilization over 15 years across the globe.

Social Media

Many different fields of expertise are showcased on social media, including fashion. According to Shopify, some of the most used hashtags on Instagram of all time include #OOTD (outfit of the day) and #Fashion (2021), highlighting the use of the platform for fashion content. Over the years, Instagram added functions to adapt to this popular content. Not only can influencers share their outfits, but they can also tag the brands in the picture and share the link for the article on their post, making it very accessible to the consumer.

A study by Lou and Yuan looked at different variables which can contribute to influencer marketing effects on consumers via social media (2019). After going through the different variables found in their literature review, they also added in three variables specific to the follower such as their involvement (in following the influencer's content), age and gender

to the six variables found in literature (informative value, entertainment value, expertise, trustworthiness, attractiveness, similarity (Lou & Yuan, 2019).

The results of their study showed that informative value and some components of influencer credibility can affect trust and consequently, affects brand awareness and purchase intentions (Lou & Yuan 2019). This highlights the potential that lies in harvesting a relationship with an audience. Since influencers can promote brands and are remunerated for these partnerships, there is an incentive for influencers to continue to share content on social media. Creating content for followers can potentially influence consumer behaviour and result in monetary gains for the influence.

1.2.2 Shorter Lifespan of Clothes

Shorter lifespan, caused by the poor quality also impacts demand. It makes it harder to repair the garment and use it for a longer timeframe. Also, repairing or tailoring clothes can sometimes cost more than acquiring new inexpensive pieces. Therefore, the cheap quality and low prices allow consumers to buy new garments instead of repairing the ones already in their wardrobe. A recent survey in the U.K. confirmed that out of a sample of 2038 respondents, 30% of them had clothes in their wardrobe they were not wearing because they needed repairs (Diddi & Yan, 2019). Examples of these repairs were a button fix, replacing an elastic or mending a broken zipper. Around 20% of these respondents also explained that they could have worn half of their unworn clothes if they were repaired (Diddi & Yan, 2019).

Indeed, the lack of skill regarding clothing repair has been a barrier for the respondents in wearing their clothes longer. On the other hand, having to go and get the clothes repaired was a chore for them and was also considered expensive. Also, this perception of clothes being disposable also means that consumers are not attached to their clothing and will get rid of it when they see fit, which is often too soon (Didi & Yan, 2019). Therefore, the poor

quality of clothes contributes to wardrobes not being worn to their full potential and means that more clothes are disposed of at a quicker pace.

Therefore, the poor quality of clothes today accelerates the wearing out of the garment, which can contribute to purchasing more new clothes.

1.3 Textile Recycling

The following section will address the different methods, different programs, and stakeholders, as well as the challenges associated with recycling clothing.

1.3.1 Textile Recycling Methods

There are four main approaches used for recycling. The primary approach, also described as reusing, recycles industrial scraps, without modifying the textile. Once cleaned, the fabrics are cut and sewn into something new, the remaining scrap pieces are sent for incineration (Vadicherla et al., 2016).

The secondary approach is more technical in the sense that it requires melting the different materials, such as the plastics, to re-use in the fabrication of a new product of lesser quality. For example, it is possible to melt the plastic fibres down to a liquid form that is malleable. A common practice is to use the liquid form to create longer strands of the fibers that are spun and stored to be used later (Vadicherla et al., 2016).

The tertiary approach requires hydrolosis or pyrolosis which is a chemical reaction to break bonds within the material to retrieve monomers or fuel. This chemical reaction achieves a similar goal as the secondary approach; to have the material completely broken down into pellets which can then be reused. As explained above, these granules can be

melted down into a liquid form and reshaped into what is needed, such as long strands of fibers (Zamani et al., 2014).

The quaternary approach is the incineration and energy recovery process. Incineration is a common practice used in waste management. As opposed to the United States which sends 64.5% of textile waste to landfills, the European Union opts for incineration (Vadicherla et al., 2016).

When analyzing the four different approaches to recycling, a business case in Sweden used the Life Cycle Assessment method (LCA). The goal of their study was to quantify the energy used for the different approaches and to assess their global warming potential (GWP). To accomplish this, the entire process was mapped and measured using a unit of measure of one ton of waste. The method requiring the least energy and providing the most savings in terms of CO2 emissions is the primary approach, the reuse of the materials, since the process does not require breaking down the fibers. The method which has the most negative impacts for the environment is the quaternary approach, the incineration method (Zamani et al., 2014).

Though the goal of this paper is not to provide an environmental analysis of these different approaches, it is important to keep them in mind when looking at the different recycling and reselling models.

1.3.2 Textile Recycling Parties

Clothing & Footwear Brands

Brands have adopted programs to recycle the materials of their pre-loved garments to create new products. Nike is one example of a clothing brand that has launched many programs to help them achieve their vision of circularity: a future without waste (NikeGrind).

Created in 1992, NikeGrind's goal is to divert the surplus from the manufacturing process away from landfills (Curtis & Hanson, 2019). Recuperated textiles are either pre-consumer, from the manufacturing site (apparel or footwear), or post-consumer. Materials such as textiles, leather, rubber, foams, and thermoplastics are recuperated and then used as a basis for new products, such as the automotive industry for cushioning (Textiles - Nike Grind Materials). Footwear is also a great source of rubber for Nike since it is the largest footwear manufacturer in the world (Curtis & Hansson, 2019). Curing the outsoles and flashing them into various pellets, allows for the rubber to be reused). Nike is able to produce pellets of different sizes and colors to then be reused. These granules can be used for various purposes, such as basketball courts, soccer astro turf fields and gym flooring (Rubber - Nike Grind Materials).

Third Party Programs

Other third-party companies have also turned to clothing recycling. The main mission is to collect clothing that cannot be reused or resold as is and provide alternate solutions. Two solutions for clothing recycling will be explored: exportation to another continent or remanufacturing into a new fiber.

Trans-Continental Textile Recycling Ltd., headquartered in Surrey, British Columbia, is an example of a textile recycling company offering both solutions. The company collects clothes from charities or thrift shops that have not yet sold or are not in good enough condition to sell. The company then sorts the clothes and based on each garment, decides which alternative is best for the garment.

The recent shift in the materials used to manufacture clothing has had a major impact on the recycling possibilities. Clothes are now made up of a mix of fibers instead of one fiber and manufacturers have weaned off natural fibers such as wool and cotton. An estimated 60% of materials that are used are plastic-based (Transcontinental Textile Recycling, 2020). Unfortunately, being able to sort and reuse the garments is becoming more complex. Fiber separation for textile recycling is very much at its beginning and has not

made enough progress to tackle this issue (Transcontinental Textile Recycling, 2020). This has had an impact on the activities of third-party companies.

The other possibility for the collected clothes is Africa. Many garments are sent to African countries. Thousands of seamstresses are employed to fix up the clothes. Whether the garment needs tailoring or button repair, the clothes are revamped and are in a good enough condition to be worn again. These are then sold in local markets to neighbouring communities (Claudio, 2007).

Figure 4 A woman shops at a *mitumba* (Swahili for "secondhand") market in Nairobi, Kenya, (Claudio, 2007)

Note: The image demonstrates the amount of clothing imported into African markets.

1.3.3 Textile Recycling Challenges

What affects the recyclability of these mixed fabrics is the separation of the fibers. Indeed, the technology and infrastructure does not yet exist in many regions. It is hard to separate the clothes, as some are made of synthetic, natural or of a mixed blend of fibers. Being able to differentiate the different blends is still a challenge and the only possible solution that has been explored so far is the use of infrared sensors, which is not widely available (Palacios-Mateo, Meer, & Seide, 2021). Also, within fabrics made of the same fibers (100% cotton for example), other components such as the labels, buttons or zippers can be made of other materials. Being able to separate the different fibers on a garment can be very expensive. Indeed, the type of machinery needed is a textile shredder. These can be priced at over 4 million dollars CAD (Mercier, 2021). This does represent a large investment for many companies and can impact the decision-making when looking at different business ventures in the textile recycling industry.

This shift in textiles does highlight the difficulties of ensuring sustainable projects or circularity. The composition of the textiles dictates the possibilities for the second life of the textiles. Indeed, as more and more clothes must be recycled and be found a second purpose, the composition will make it very difficult if the R&D required to do so is not advancing as quickly as the shifts in the materials used.

1.4 Textile Resale

The following section will address the different methods, different programs and stakeholders, as well as the challenges associated with reselling clothing.

1.4.1 Textile Resale Market

The resale of clothes consists of clothes being in a good enough condition to be resold to another consumer. The interest in the resale market is growing. This is due to the

increasing attraction to younger generations. In fact, by 2025, the resale sector is expected to grow 11 times faster than the traditional retail sector and will also catch up and surpass the traditional thrift and donation portion. In 2020 alone, 542,350,138 pieces were bought second hand in the United States, diverting them from landfills, incineration and other recycling processes (ThredUP Inc., 2021). Two different groups taking part in the resale market will be explored: the clothing brands and third-party platforms.

1.4.2 Textile Resale Parties

Clothing & Footwear Brands

Brands are starting to take part in resale activities and have started to tap into this market. Brands such as Lululemon, Patagonia, Arcteryx and Levi's are examples of brands that are starting to resell their second-hand merchandise.

In 2020, Levi's launched their own *recommerce* site, a buyback program called Levi's SecondHand. The brand manages to do exactly as their website slogan claims: "keeping coveted Levi's in circulation and out of landfills". However, Levi's will only buy back certain items which include shorts, jeans and jackets and will not take back certain T-shirts, sub-brands, kid's clothes or certain collections. With regards to the process, clients book an appointment at a store and bring in their articles for appraisal; if the garment is bought back, they will receive a gift card for the value of their articles ranging from 5$ to 35$ depending on the type of article and its condition (Levi's SecondHand). The articles are then made available on their website to be sold and offered a second life.

Since Levi's only focuses on a select few of their items, some operations are simplified. The pictures and garment specifications do not require constant updating, which translates into less time and labour costs associated with the platform maintenance. Other costs associated with this program could include reverse logistics back to their distribution centers, website upkeep and inventory maintenance. The fiber production and garment

manufacturing costs are eliminated in this business model and are replaced with the cost of acquiring the second-hand garment, the amount of the gift card. Therefore, much of the financial and environmental costs of manufacturing, such as the natural resources, the energy, the pesticides, and labour are reduced in their resale business model.

The resale option for clothes is not only interesting from a business standpoint but can offer very positive impacts for the environment. The idea of reselling clothes could help mitigate the amount of clothes that are currently in circulation. Reports have explained that 414.8B of CO2e would be displaced if every retailer sold 1M of pre-loved garments (ThredUP Inc., 2021).

Also, incorporating more sustainable practices is key for the future of the fashion industry, explains the Fashion Pulse Report published by the Boston Consulting Group. Indeed, if the current trajectory is maintained, the Pulse Score will continue to stagnate if no further efforts are made, and the industry output will continue to rise (Martinez-Pardo & Krueger, 2019). Therefore, these practices are not only valuable for the environmental impacts but also to satisfy consumers and contribute to a positive perception of the industry. Sustainability practices are becoming more and more an important driver for purchasing decisions (Martinez-Pardo & Krueger, 2019).

Third Party Programs

Online platforms

Other third-party companies have also created a platform for resale. Consumers can sell their clothes directly to other consumers, cutting out the intermediary entirely (clothing brands). These platforms combine social networking with rudimentary concepts of e-commerce (Park & Armstrong, 2019). The seller sets up their account and posts their articles for sale. The closet of the seller is showcased in a similar manner as Instagram, displaying different square-shaped photographs of the items for sale while expressing the

seller's personal style. Buyers scroll through the posts on the platform to browse through the articles and make offers on the ones they like.

Buyers and sellers are also part of a larger movement: collaborative consumption in the sharing economy. The sharing economy is a trend which has grown exponentially throughout recent years and is based on economic and technological innovation. Indeed, technological innovation is a driving factor, it has created platforms to connect people who are looking to sell or looking to buy. The benefits of the collaborative consumption trends are many. Not only does this push back the end of the product's lifecycle, but it also allows to maximize the uses of each product and encourages the design of a more durable product (Hamari et al., 2015).

Poshmark is one example of a platform that connects buyers and sellers. Poshmark connects a total of 70 million users and on an average day, hosts 54 million social interactions, resulting in 1.3B of sales in one year alone. On average, users spend 27 minutes a day browsing through second-hand clothes a day (Debter, 2021).

When comparing Poshmark's business model to a clothing brand's buyback program, there are some differences between both models. A large portion of Poshmark's revenue is based on the commission they collect on the sales. For items priced under C$20, there is a flat commission of C$3.95 and for items priced over C$20, Poshmark there is a 20% commission (Poshmark Canada Inc.). Poshmark is very separate from the overall operations; they simply provide the platform. Sellers are responsible for inventory, including pictures, sizes, or descriptions. Also, Poshmark does not need any distribution centers or any labour to take care of the return, selling and shipping. Poshmark simply provides the shipping label, paid by the buyer. These strategic decisions allow Poshmark to reduce many costs compared to a clothing brand's buy back program.

Brick & Mortar

There are also more traditional business models that have been around for a longer time: thrift stores and charitable organizations. Indeed, in the United States alone, millions of pounds of clothes are donated a year, either to family or to GoodWill and similar entities (Ha-Brookshire & Hodges, 2008). What drives individuals to donate is not the desire to do good and be charitable, but rather to get rid of clothes while cleaning (Ha-Brookshire & Hodges, 2008). Individuals often go through their closet and make two piles, keep and toss, and carefully select what to put in the toss pile. The toss pile may include what to donate and what to dispose of. Donating clothes then provides charities with free products to sell (Ha-Brookshire & Hodges, 2008).

What is key about reselling business models, whether it is the business or the peer-to-peer model, is that it puts the article back into circulation and pushes back the end-of-life of the garment.

1.4.3 Resale Challenges

Resale saturation

The second-hand market is expected to double in growth in the next 5 years, for a market value of 77B USD. This market will also see a rise in more curated items than ever before due to the availability of clothing in wardrobes across the globe. The American resale sector is also expected to grow 11x faster than the traditional retail sector in the coming years. This growth is driven by more and more sellers seeing a low barrier to entry due to the user experience of online selling platforms. In 2020, an estimated 50.6 million sellers are on the resale platforms and there are an estimated 118.8 million anticipated sellers to join these platforms in the years to come (ThredUP, 2021).

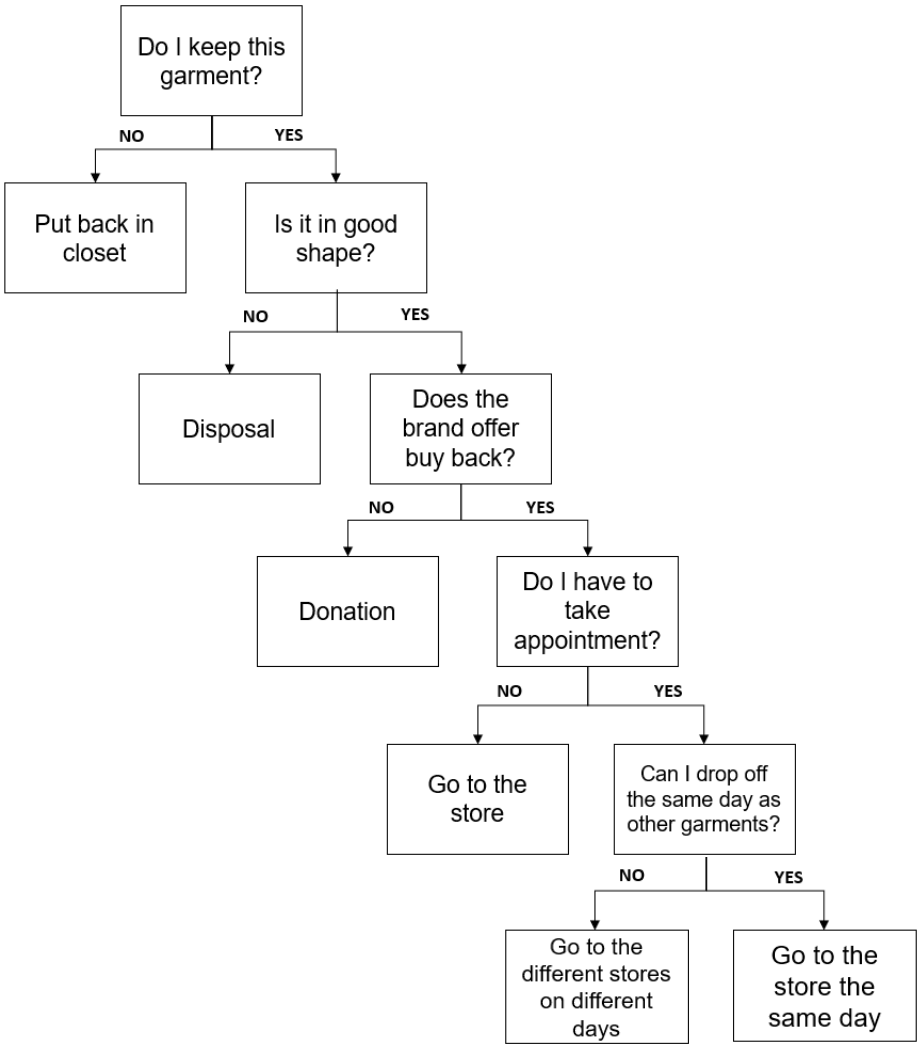
Another reason for sellers to join the platforms is the enormous supply of unused clothes across the globe; an estimated nine billion pounds of clothes are sitting idle in closets (ThredUP, 2021). Therefore, consumers are finding a new way to declutter and

join a business model that offers financial incentives. Whether it is resale through third-party platforms or through brand's buy back programs, consumers can part ways with their clothes and make some money.

However, as previously mentioned, clothing donation often stems from a more practical motive and not from altruistic motives If on average, Americans are getting rid of an average of 80 lbs of clothing each year (Bick, Halsey & Ekenga, 2018), how will they choose where to drop off these clothes and divert them from the landfill? Given that an estimated 60% of retailers in the United States have expressed an interest in offering pre-loved clothes to consumers, which is equivalent to 23.8K retailers (ThredUP, 2021), it is important to understand the potential impacts on the individuals who want to sell their clothes to the second-hand market.

Within this amount of clothing, there will be various brands and levels of quality of articles. The figure below depicts the decision tree of the consumer since the individual will have to sort through their clothes and establish a plan of action. Given the opportunities provided by the brands themselves, the different brands will have to be divided up and each dropped off separately at different locations. The donor may even decide if it is worth the detour for the small credit or if they will just bring the articles elsewhere. For the quality of the clothes, some articles may have enough value to resell on various third-party platforms such as ThredUP, Poshmark and Depop. The rest may be donated to friends and to charities or thrown out. Consumers will go through their closet to pinpoint what should be donated and what should be sold to make some money. This is a lot of different steps for an individual who is seeking to declutter their closet and does not see the value in donating or reselling their clothes. This amount of clothes donated per year may even be divided into more frequent and smaller donations, so the plan may even have to be executed a few times a year.

Fig 5 Consumer Decision Tree



Note: The figure expresses consumer journey when deciding which alternatives best fit their clothes for disposal.

Not only is this a barrier for the donors, but also for the brands and platforms that require these materials for their business models. If more and more alternatives exist for the consumers, the competition for these clothes may increase. Brands may enjoy their existing business models for their projects and the traffic in their stores which help maintain a relationship with consumers dropping off pre-loved garments. However, it may become very difficult in the future for brands to differentiate themselves amongst the competition. For brands, incentives may be required to become more and more competitive which may eat into the profits of the resale programs. They must keep in mind

that they will compete with more and more other clothing brands as well as with third party platforms that allow the individual to sell their whole wardrobe from home.

The Education for Textile Collection

Regardless of what they are made of, clothes need to be disposed of in the best possible manner to avoid ending up in landfills. A major component to clothes being recycled or resold is the attitudinal factor, is the 'acceptance of recycling activities, perception of the benefits and problems of recycling' (Yee, Hassan & Ramayah, 2016). Another element that plays a role in consumers' habits is the convenience of recycling drop-off sites. Indeed, the time and effort the consumer must invest in the drop-off is key and must be taken into consideration when evaluating the current model.

Once the clothes are donated, the clothes are then sorted through by the staff and volunteers of the different organizations. In the case of the Montreal charity *Le Chainon*, which deserves women in Montreal in precarious situations, there is an overload of valuable donations. On average this charity receives 150 bags of donations a day but cannot resell all the donations as one in two bags is thrown out. The main reasons being the quality of the donations, many of them are either ripped or soiled, which means they cannot resell the items. At Renaissance, a thrift store that also runs a program for social reinsertion, has a similar experience with donations. An average of 10-15% of donations cannot be used for the same reasons. What is not kept must find another solution, which is either selling them to recycling companies or throwing them out (TVA Nouvelles, 2021).

The difficulty of receiving quality items and sorting through the donations can represent considerable labour costs. Therefore, better education of consumers is necessary to lower costs and encourage these types of resale projects. Having consumers know where and what they can donate or dispose of is key in sustaining business models focused on recycling and reselling.

Chapter 2
Methodology

2.1 Context

The purpose of this paper is to get an understanding of the fast fashion industry and understand the components that affect its sustainability. A literature review allowed me to gain a basic technical understanding of clothes manufacturing, to map out the different stakeholders involved in the industry and to understand the different recycling and reselling models. It was also important for me to understand the mechanisms that influence the demand and supply for clothes, an important component of fast fashion. This research also allowed me to understand the current solutions and ideas that would contribute to sustainability in the industry. However, to push the research question even further, it was crucial to complete this literature review with some field research.

2.2 Methodology

The chosen methodology was a qualitative approach; this approach was deemed more favourable as it allowed for exchanges with the interviewees. This allowed me to gain more context of the reality of the different individuals and ask certain questions that were specific to each reality. Also, given my specialization is Management of Social Innovation, it was key for me to also incorporate business cases that were innovative or could be applied to this industry to be able to evaluate them as well.

Therefore, I decided to combine an analysis of business cases as well as interviews. The business cases were more focused on innovation and new ideas. On the other hand, interviews were to allow me to interact with different individuals that could add onto my business cases.

2.3 Data Collection

2.3.1 Description of the Sample

To enrich my research question, I interviewed individuals that belonged to the different stakeholders involved in the fast fashion industry that could have an impact on sustainability. My sample was made up of 12 individuals that all do not work for the same company. These individuals were either references from my network, people found on LinkedIn or people that were referred by other interviewees. The interviewees could be divided into four categories:

A. Individual with experience in resale operations (owner or employee).
B. Individual with experience in textile recycling operations (owner or employee).
C. Expert in the field of textiles or clothing.
D. Expert in the field of waste management.

The individuals made up of the two first categories either own or work for companies involved with these key activities. For resale activities, individuals who had experience with online platforms and brick & mortar boutiques were sought. For recycling activities, individuals who had experience with textile recycling and transformation were sought. The third and fourth category is made up of people I considered more 'generalists', having experience in the textile and clothing industry.

This diversified sample allowed me to be exposed to a variety of situations which is key for qualitative research (Romelaer, 2005). It also allowed me to compare the different models and see if there were any complementary aspects to the different alternatives. I also looked for experts that understood textiles or of waste management o help me draw parallels and try to eliminate biases if I only interviewed employees or owners of recycling and resale models. The following table summarizes the participants:

Figure 6 Summary of Interviewees

Name	Function	Organization
Catherine Coghlin	Director	Eva B
Élodie Lourimi Rezo	Co-founder & Head of Strategic Development	Upcycli
Mélissa Turgeon	Founder & President	Cul-de-Sac
Randy Mandombo	Manager of Business Development & Marketing	Friperie Chic & Commode
Marianne-Coquelicot Mercier	Founder & Consultant in Textile Circularity	Chroma
Vincent Wilson	Owner	Versatile
Isabelle Lessard	Lecturer	École Supérieure de Mode ESG UQAM
Janie-Claude Viens	Development Officer	Concertation MTL | Communauté de pratique - Secteur textile &
Paulette Kaci	General Director	Vestechpro
Carolanne Thibault*	Business Development	Waste Management Company
Jérôme Cliché	Industrial Development Officer	Recyc-Québec

*Fictious name

Note: The table summarizes the different interviewees. The first four individuals belong to Category A, the following two belong to Category B, the following three belong to Category C and the last two belong to Category D.

2.3.2 Data Collection Method

The research was done using the semi-structured interview model. This method was chosen because it allowed me to prepare questions and themes I needed to explore in my research and still allowed for fluidity and exchange between the interviewee and interviewer. This method also allowed me to complete and enrich the research and conclusions found in the literature review (Romelaer, 2005). The complete interview guide can be found in Appendix 1.

Since the interviewees had different work experiences and realities, not each question was used for each interview. The interview guide was used in a tailored manner for each participant using the bank of questions. Since the interviewees also knew my research topic and had a summary beforehand, they were also able to come with certain information ready to share. The interviews were done both virtually and in person, ranging from 25 minutes to 75 minutes. Only one interview was not recorded.

2.3.3 Analysis Methods

For the recorded interviews, the transcripts were written down. The verbatims allowed me to highlight the different elements that were relevant to the themes explored. The themes explored included the mission of the organization, projects accomplished or to come, influences and pressures on the industry. Being able to categorize the different relevant snippets per theme allowed to regroup enough context and information to be analyzed. This helped structure my research and allowed to follow in the same direction of the first section; reviewing manufacturing, demand and garment end of life processes.

Chapter 3
Strategies and Policy Recommendations

The aim of the following chapter is to analyze the business cases and qualitative research that was completed. The analysis reviewed their contribution to the industry's sustainability and mitigation of the negative impacts and the obstacles of fast fashion mentioned in the analysis.

These recommendations will be separated into three main categories: the manufacturing of clothes, the demand of the clothes and the recycling of clothes. These will be then divided among the different stakeholders involved in each segment. The different stakeholders in this industry are many, but those explored in the following section include the governing bodies, investors, clothes manufacturers, brands, recycling companies and research & development hubs.

3.1 Manufacturing Clothes Moving Forward

One component that influences the overall impact of fast fashion is how the clothes are manufactured. This includes the fibers and the design of clothes during the manufacturing phase. Indeed, the processes and decisions during the manufacturing phase will have an impact throughout the clothes lifecycle, including how long the garment will be used and what to do with the garment once discarded.

These decisions not only impact the manufacturers but the players that intervene throughout the supply chain. To influence certain decision-making, public and private entities can come into play to help the transition. These different stakeholders will also be explained in the following section.

3.1.1 Eco-conception

The main element explored in this section is eco-conception. Eco-conception is a way of designing products that aims at diminishing the environmental impacts throughout the lifespan. It looks at the different stages of the product's life cycle, including the raw materials extraction, manufacturing, transportation, use of the garment and its disposal (Ministère de l'Économie et de l'Innovation, 2020).

Starting with the composition of the garment, alternative resources can be chosen to reduce pollution throughout the supply chain, including: the manufacturing of the textile, the use and upkeep of the garment, and its disposal. Instead, other resources could be favoured, such as bio fabrics or sustainable bio-textiles. Bio fabrics are generated through bioengineering; microorganisms like bacteria, yeast or algae that can ‘be designed to produce biopolymers which can be extruded using a spinneret to create yarn, or can be grown in a mould, to create a material that can be harvested with zero waste’ (Liu et al., 2021).

The different characteristics of these textiles such as the structure, thickness, colour and texture can be chosen ahead of time, therefore creating the desired biofabrics. Not only could these fibers reduce the footprint of the manufacturing phase, but it could also help reduce water pollution by the plastic released during each wash (Liu et al., 2021). However, it is important to review the durability of these fibers compared to the synthetic fibers. The fibers deemed most sustainable must also be durable to avoid premature wearing out of the garment and make the consumer buy more often.

Another process that could be enhanced is the patterns. As previously mentioned, this step can represent up to 15% of overall fabric waste (Joshi & Chowdhury, 2021). Being able to cut the fabrics in a more optimized way could help reduce the fabric waste produced during the cut and trim process, reducing the overall fabric waste.

Marianne-Coquelicot Mercier, a consultant in circular economy in the textiles sector and founder of Chroma, explains that the manufacturing phase of the garment is where she intervenes and helps companies optimize their resources. The review patterns and materials are often what she works on with her clients. What motivates the companies to review their processes is really witnessing the waste produced in the manufacturing phase and motivates them to explore what can be done to remediate the situation: '*C'est presque 100% du temps la porte d'entrée. Ils veulent faire un projet pour voir quoi faire avec leurs retailles'.*

These conversations allow Mercier to review the strategies using the lenses of eco-conception and review different strategies with the companies, including how to make more durable products or how to market the garment. Another approach she uses is to set certain objectives with her clients; for example, trying to reduce fabric waste in the pre-consumer phase from 15% to 3%.

However, eco-conception and optimizing resources cannot only be beneficial for the environment, it can also represent financial benefits for companies. According to a study in Quebec, conducted by the Pôle Éco-conception and the Institut de développement de produit, the profitability of products is 12% higher if they are conceived in a sustainable way compared to a conventional product. This approach to product design can also strengthen relationships with clients and can be a differentiating factor in the market (Ministère de l'Économie et de l'Innovation, 2020). Therefore, eco-conception can be equally beneficial for manufacturers from an economic standpoint.

3.1.2 Fibershed Quebec

Inspired by the Soil to Soil vision of circularity, the mission of the Fibershed movement is to create a 'regional fibre system centered around local fibres, local dyes, and local labour'. The goal is to create an ecosystem which benefits partners across the supply chain, ranging from farmers to designers. Fibershed is coming to Quebec in collaboration with École supérieure de mode (ESM) ESG UQAM. Isabelle Lessard, lecturer at ESM

ESG UQAM, works closely with Marie-Eve Faust, the director of the project and the director of ESM ESG UQAM, and explains that though they are still in preliminary phases, the goal is to create a similar ecosystem here in Quebec (2021). They are currently meeting with different stakeholders to evaluate the interest and potential partners. For her, the project requires to have all these stakeholders involved to see an impact and see the project succeed.

Figure 7 Overview of Soil to Soil (Kruesi, 2021)

Note: The figure expresses the different steps involved in a Soil to Soil approach.

Lessard explains that the project embeds itself within eco-conception; post-industrial and post-consumer waste is being tackled by many other parties in Quebec. The project focuses on the initial phases of the supply chain. The goal is to capitalize on the resources available in Quebec and Canada to create this ecosystem, and then pinpoint what needs to be done elsewhere. Lessard explained that Fibershed Quebec is exploring the wool, alpaga fleece, milkweed, and hemp as potential leads here in Quebec and also mentioned that designers are looking forward to fibers made here in Quebec.

Not only does this project allow for circularity and positive environmental impacts, the economic and social impacts of these projects could be promising. This project could insert itself into economic resilience, helping Quebec's different stakeholders thrive.

> *Le fait de produire de la fibre vierge et des tissus écoconçus, compostables et respectant l'approche Soil to Soil fait partie des stratégies de circularité textile.*
>
> *-Isabelle Lessard*

3.1.3 Policy Recommendations

To encourage the use of more sustainable materials by manufacturers and improve the overall footprint of the manufacturing phase, governing bodies can offer subsidies for sustainable materials or can impose fees on unsustainable fibers.

By offering financial incentives, manufacturers could have the capacity to source the desired fibers and textiles. As an example, buying sustainable, certifiable or recycled fibers would allow the companies to be less taxed (reduction of value-added tax) to encourage their sustainable practices. Other examples include tax reforms which would support the transition to organic cotton and recycled PET from conventional cotton and polyester (Liu et al., 2021) Involving governing bodies and including economic benefits for the manufacturers would allow the transition away from fibers that are difficult to recycle and set the tone of the industry moving forward. Depending on the fibers chosen, this will also help businesses as adopting these alternative fibers can decrease the exposure to the volatility of prices of natural resources (Ellen MacArthur Foundation). For example, cotton has seen very volatile prices in the United States due to political and environmental factors; trade agreements and harsh crop conditions have been the cause of the fluctuating prices (Bureau of Labour Statistics, USA).

To encourage manufacturers to use more sustainable fibers, a definition of what sustainable fibers is the first step. This requires establishing a standard, which sets a

minimum requirement, indicated in percentage, for a standardized measure. In the case of textile composition, the standard required could be based on the composition of the clothing and allow for a gradual transition. This transition will allow different partnerships to come into play with enough time. For example, it could be that the garment must contain a certain percentage of natural fibers (ex: over 70%) to start. As years go by and more sustainable fibers are introduced to the industry, the government could require 100% natural fibers or a mix of natural fibers and recycled fibers (ex: recycled polyester).

The government could also fund research to complete lifecycle analysis of different fibers to truly determine which fibers are less harmful for the environment as more recycled and sustainable fibers come to market. Though these standards often exist to ensure there is no harm to the health of the users, these standards focus on the harm to the environment. This analysis could provide insight to the decision-makers regarding the fibers they want to subsidize.

However, it would be beneficial for governments to understand the industries that make their economies thrive. If the economy does thrive on textiles, imposing a harsh tax on these players could have major downfalls on the economy, on the industry and on employment. Therefore, this transition may be more difficult in countries where they produce polyester such as China, India and Indonesia (Sewport). Governments must understand the impacts throughout the textile industry and evaluate the plausible impacts before instating certain financial measures.

3.1.4 Investors' Impact

Environmental, Social and Governance (ESG) factors are starting to be taken into consideration by investors. These non-financial factors have gained popularity as many companies are choosing to disclose these metrics in their annual reports. This growing popularity can also be seen through the progress made by certain institutions; the Sustainability Accounting Standards Board (SASB), the Global Reporting Initiative

(GRI), and the Task Force on Climate-related Financial Disclosures (TCFD) are working towards the standards that could be used during different analysis for investments (CFA Institute).

Even if these standards are still in the works, investors can influence decision-making within companies when it comes to ESG factors. In May 2021, BlackRock, the largest fund manager in the world, was looking to influence a change within Exxon Mobil. BlackRock is Exxon Mobil's largest investor. The large institution decided to back a firm called Engine No. 1 to join the board of Exxon. This decision came as BlackRock and Engine No. 1 wanted to influence Exxon into moving quicker in fighting climate change (Philips, 2021). Indeed, Exxon's leadership was changed, highlighting the influence investors had on the vision and direction of this company. Therefore, investors looking to improve ESG can have an important role in doing so.

Another influential institution, the Caisse de Dépôts et Placements du Québec (CDPQ), works in ESG investing and has committed to help fight climate change. In September 2021, the CDPQ unveiled their climate strategy which contained four major pillars. By 2025, the firm wants to hold $54 billion in green assets and by 2030, they want to reduce the carbon intensity of the total portfolio by 60%. CDPQ will also create a $10-billion transition envelope to target the decarbonization of carbon-intensive industries as well as exit oil production by 2022 (CDPQ, 2021).

These examples are aspirational and could be applied to different stakeholders involved in the fast fashion industry. Seeing investors shift towards environmental, social and societal issues could help mitigate the negative impacts of the fast fashion industry and provide an external pressure to decision-making. These firms can look in their portfolios and pinpoint which actors can be influenced to affect positive change. Indeed, if more investors decide to invest in more sustainable sectors, this could influence all stakeholders involved to change practices or processes in the industry.

3.1.5 Educational Institutions

The manufacturers and designers of tomorrow are the students of today. Indeed, the institutions that offer training can play a role in training the future stakeholders in the industry. Vestechpro, a Collegial Center for Technology Transfer, is affiliated to the Marie-Victorin College in Montreal, Quebec, which offers programs in Fashion Design, Fashion Commercialization and Production (Apparel Research and Innovation Centre).

One of Vestechpro's missions is training and knowledge transfer. An example of this is training provided to students at the Marie-Victorin College as part of an extracurricular schedule. A Summer School focused on sustainability, an event that was postponed due to the pandemic, is led by Vestechpro. The participants will explore themes such as eco-conception, raw materials, production, commercialization, distribution, and end of life processes. Paulette Kaci, the General Director of Vestechpro, shared that all the available spots for the summer school were reserved and sold out. This speaks to the interest in learning more about sustainability in the fast industry. This type of training and sensibilization around the industry can help spark discussion and reflection.

3.1.6 Communities for Creators

Concertation Montreal connects elected officials and socio-economic leaders of the Island of Montreal to help initiate and support innovative initiatives. Within this lies the Ecological Transition axis, which encompasses the Community of practice for textile and clothing. The Metropolitan Fashion Cluster in Montreal called mmode and the Réseau québécois des femmes en environnement also support this project (Concertation Montréal).

Janie-Claude Viens, Development Officer for the Ecological Transition, explains that the mission for this Community of practice is to unite different creators on the Island of Montreal and provide them a space to exchange, discuss potential projects and feel a sense of belonging. Currently, there are 15 members part of this project, and they meet every

two months to exchange. Across these 15 members, there are diverse business models ranging from upcycling to resale to recycling.

One benefit to keep in mind with these exchanges is that members can share their experience, their lessons and their strategies which can help other members understand what could work or not.

> *Chaque entreprise est unique avec un écosystème qui lui est propre. Les stratégies alternatives qui sont développées en réaction au modèle du fast fashion peuvent leur convenir ou non. Il en vient à chaque entrepreneur de décider de la voie à prendre pour transitionner vers un modèle plus responsable. Dans les modèles alternatifs se trouvent des opportunités de fidéliser davantage le client. Les gens achètent selon leurs valeurs, selon ce qui résonne bien avec eux donc chaque choix qui est fait tout au long du cycle de vie du produit amène l'entreprise à de se démarquer avec un modèle d'affaires unique.*
>
> *-Janie-Claude Viens*

For the following year, the goal is to incorporate structuring projects. So far, two have been explored. These include:

1) a better management of fabric waste during the manufacturing process which starts with quantification and characterization of existing waste in hope to provide solutions for an optimal use of this waste
2) a Fabrication Laboratory (FabLab) for textiles to allow for experimentation and prototyping, and gives space and a shared access to machinery

These project proposals are a result of the exchanges amongst the members and will help them tackle their needs for the following years.

When looking at these types of exchange spaces and communities, there are elements that can be beneficial for tackling the negative impacts of fast fashion. This allows to scope

out what strategies work and which ideas can be used by different companies during their transition towards better practices. It also allows for members to team up to have access to technologies they may not be able to invest in on an individual account.

3.2 Decreasing the Current Demand

Alongside manufacturing more sustainable clothes, decreasing the current demand could reduce the quantity of clothes in circulation. The rental programs, second-hand clothes platforms integrated into current brands and a focus on the care of clothing can allow garments to be used longer and could help reduce the demand for new clothing. Business and government initiatives are explored in the following section.

3.2.1 Increasing the Lifespan of Clothes

Improving the Care of Clothing

Another factor that could contribute to the decrease in demand is increasing the lifespan of clothes. Aside from changes in trend, the care of the clothes dictates how long clothes stay in circulation, avoiding additional purchases. If a garment's lifespan is extended by three months, this would lower the water, carbon and waste footprint by 5-10% of the industry (Leibowitz & Croke, 2020).

The Council of Fashion Designers of America, inc. (CFDA), whose board of directors is made up of some very well-known names in fashion such as Tom Ford and Vera Wang, has been looking more and more into improving sustainability in the industry. One of their pillars includes customer care and repair. When looking at the care of clothing, the CFDA provides some insight on how consumers can prolong the lifespan of their clothes. This includes avoiding drying machines, using more eco-friendly detergents, and following specific washing and drying instructions depending on the fiber that is used. Alongside from expanding the use of the clothing, this can also help the pollution of micro-plastics released during wash (Leibowitz & Croke, 2020).

The education of consumers and the costs associated can be taken over by the manufacturers and retailers. Some simple solutions include providing more informative and accessible labels which can indicate what specific guidelines are required for the piece of clothing (Leibowitz & Croke, 2020). Companies could color code a label or use a small Quick Response code (QR Code) and have the explanation easily accessible on their website. This would reduce the size of the label needed and consumers would be redirected to their website or app for more information. This is an occasion for retailers to create content on their website and foster relationships with their consumers. Other content that companies can create on their website would be the maintenance and repairs to the garments as well as such as the materials and their recyclability as well as any needed details for disassembly (if required) (Leibowitz & Croke, 2020). This can engage the audience and equip consumers with what they need to mend and quickly fix some garments to keep them longer.

For more complex repairs that require expertise, a solution could be to provide repairs in-house at certain locations where the traffic justifies the investment. What could be beneficial for the brand, aside from another stream of revenue and strengthening customer satisfaction, would be to keep track of the data regarding common repairs (Leibowitz & Croke, 2020). This can be used to improve the quality of manufacturing to increase customer satisfaction. For stores with less traffic, brands could also create partnerships with local seamstresses to stimulate the local economy.

Offering the content or skill to repair clothing can be beneficial in using clothes for longer time spans. Either way, if consumers can use their clothes longer, it can contribute to the decrease in demand for new clothes. However, to make up for this, companies could raise the prices which would affect certain income brackets more than others.

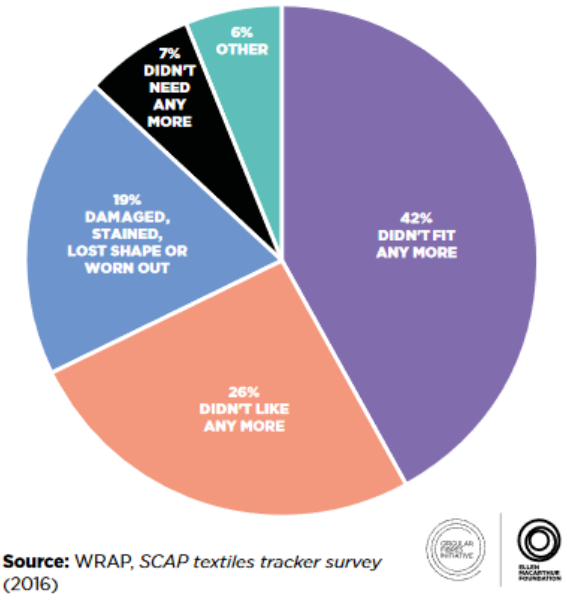
Clothing Rentals

Another strategy that could help increase a piece's lifespan is to promote clothing rental. It is important to keep in mind that besides its basic functions, clothes also help satisfy other needs such as self-expression or allow for the 'retail therapy' experience (Ellen MacArthur Foundation). New solutions should try to still satisfy these additional needs to ensure consumer satisfaction. These include different rental programs and resale platforms which could offer tailored products to different consumer segments.

Rental subscriptions allow for wardrobe variety. Consumers pay for a monthly subscription and receive several clothing articles per month, allowing consumers to change up their wardrobe frequently while removing the ownership of the clothing. Rent the Runway is an example of a clothing rental service. They offer different packages starting at 89$ USD a month in the United States, which is a package of four everyday items a month to be worn for the month. Other packages offer eight items per month and 16 articles per month and are 135$ USD a month and 199$ USD a month respectively. The service includes free shipping and returns, cleaning and allows the consumer to purchase any of the articles at a discounted price if desired (Rent the Runway Plans). Removing ownership allows clothes to be worn many times and to be well maintained. This variety also allows consumers to keep a certain level of variety in their wardrobe.

Other rental programs allow for consumers to access clothes that are needed for specific reasons and for more specific milestones or events. Examples of these are maternity wear and baby clothing, which are outgrown quickly (Ellen MacArthur Foundation). Formal wear is another category of clothing that is required for short specific events La Petite Robe Noire, a boutique in Montreal, Quebec, offers rental of formal wear. The company offers formal wear for occasions such as weddings or graduation ceremonies. Clients can book appointments to go in and try on the different articles in their size and pick styles that work best for them (La Petite Robe Noire - Boutique).

Figure 8 Reasons to get rid of clothes (Ellen MacArthur Foundation)



Note i: Breakdown of the reasons why individuals dispose of clothes. These are related to the fit, need, preference, condition of garment or other.

What is beneficial in these business models is that consumers have access to new styles and variety. Also, consumers will have outfits for specific occasions and milestones. These clothes will not belong to them indefinitely, only for their needed period. This helps decrease the demand for clothing production while still allowing consumers to splurge in the retail experience. This also allows for a more flexible wardrobe and can help mitigate some of the reasons consumers get rid of clothing. Whether there are changes in fitting and taste, consumers are not committed to the clothing, they can easily send it back and pick out new pieces. Offering these different platforms and services for the consumers would increase long-term relationships with consumers (Ellen MacArthur Foundation). Clothing rental could embed itself into the sharing economy; it is like the ride-sharing business model, which grew exponentially in the past years. Uber's revenue grew from 100 million USD to 11 billion USD in the past 7 years (Statista Research Department, 2021).

However, as time passes by, these rental programs could investigate offering clothes made of sustainable fibers to reduce the environmental impacts even more. As rental garments' lifespan may be longer, the quality and the composition of the garment is important to make it last and to reduce water pollution with the release of plastic particles.

3.2.2 Revamping the Second-Hand Clothing Market

Online Platforms

Archive

Archive is a new idea that could help clothing brands compete in the second-hand market. Archive is a platform add-on that allows brands to take control of their pre-loved items which are currently being sold by third parties.

Clothing brands can have a resale site integrated into their current website that allows customers to list their second-hand articles. Being able to retrieve data from the original product allows the clothing to be listed accurately and simplifies the experience for the person listing the garment. Once the garment is sold online, the seller can choose whether they want to be paid cash or if they want to receive a store credit; the store credit is a higher amount (Archive. How it Works).

This add-on platform can allow the brands to reap many benefits. For one, they can still increase their sales with the sellers who choose the store credit. Another point which is beneficial for the brands is to penetrate a new market of young or more price sensitive consumers by offering items at lower price points. About the operations, Archive takes charge of this, including the initial set-up; they create the e-commerce platform and integrate the product's data. They also provide customer service directly to the sellers and maintain the platforms daily to ensure smooth operations. The payment set-up for both buyer and seller are also managed by Archive (Archive. How it Works).

This integrated platform allows brands to compete with third party's resale companies. One element to look out for as this platform is rolled out is the cannibalization of other products. Having these products listed at lower prices could potentially be bought over garments that are more expensive and newer. Also, this type of incentive to the consumer would be the rebound effect. Indeed, proving a monetary reward could encourage consumers to buy more clothes or to spend the money elsewhere on other pollutant products.

Upcycli

Founded by Elodie Lourimi Rezo and Christopher Montoya, Upcycli is an online platform for second-hand clothes in Quebec, Canada. The platform shares similarities with other second-hand platforms such as Vinted, Poshmark and Depop.

However, the platform wants to embed sustainability throughout their company. Some examples that demonstrate their commitment to sustainability and ethics include refusing to sell publicity on their platform or refusing to sell the data of their shoppers. These two platforms do make it harder for their financial situation, given they must rely solely on the commission. However, their platform will see some new changes in the coming months, including three new features added to their platform:

- Integration of artificial intelligence to sort through pictures and flag those that do not comply to the seller to change to improve customer experience (ex: clothes on the floor and not properly showcased or blurry images)
- Informative content for the seller and the buyer on the positive impact resulting from their second-hand transaction (ex: buying this second-hand t-shirt saved X litres of water)
- Function that allows the consumer to scan an item in store and see if the second-hand alternatives on Upcycli

These features aim at improving the customer experience on the platform and to give the second-hand market more visibility to reduce new clothing purchases. This also allows them to increase sales on the platform. Since there is no publicity, this company needs to have a lot of sales to ensure revenue. Polishing up the user experience could also allow for more users to tell their friends to use the platform. This word of mouth could increase the numbers of users, the number of new articles posted and essentially, their sales. For Upcycli, these initiatives are focused on individual behaviour that could contribute to a greater movement:

> *On part vraiment du principe que, tu sais, on dit toujours 'le pouvoir au peuple'. Mine de rien, c'est ça. En tant que citoyen, on a le poids nécessaire pour pouvoir faire changer les choses, pour faire basculer les décisions gouvernementales. [...] Si ce sont des comportements qui se multiplient, tu vois que le collectif est très très très fort.*
>
> *-Élodie Lourimi Rezo*

Brick & Mortar

Eva B & Eva D

Eva B is a thrift store located in Montreal, Quebec. It is in a trendy part of town, on the Saint-Laurent boulevard. The boutique was born from the founder's philosophy to always reuse and revalue goods. The boutique initially started out as a second-hand bookstore and shifted into a pre-loved clothing boutique. Catherine explains that it is one of the oldest thrift stores; when the shop opened, it was one of the few thrift stores in Montreal. The boutique runs on a store credit model; they offer store credits for Eva B in exchange for the clothes brought in. in exchange for the clothes to the people who bring in their clothes.

Eva D was opened later and had a mission to penetrate a new segment of second-hand shoppers. Located closer to the downtown and close to hip and expensive restaurants, Eva

D hopes to bring in a clientele that is more wary of buying second-hand. The clothes that still have their tags on and in good shape, are sent to the Eva D boutique.

> *Eva D, Elle est ciblée pour les gens qui ont de la misère avec le 'usagé'. Mettons nos parents qui veulent s'acheter des vêtements neufs, parce qu'ils ont des jobs, être bien habillé en date d'aujourd'hui avec les goûts d'aujourd'hui. Donc cette boutique c'est du contemporain dans l'état quasi-neuf. Tout a l'air neuf, mais c'est tout de l'usager, Donc tous les vêtements qui passent pas Eva B et qui ont encore des étiquettes. On a fait notre deuxième boutique pour les gens les plus peureux de l'usager. Donc tous les vêtements sont impeccables.*
>
> *-Catherine Coghlin*

These different offers can be very beneficial for the second-hand market. Being able to differentiate the different stock and segments can help please all sorts of shoppers. These different models of second-hand stores would replicate the current store today: different styles and segments of consumers. This could continue to change the perception shoppers have of pre-loved clothing.

Friperie Chic & Commode

Some second-hand stores also allow vulnerable communities. Friperie Chic & Commode opened in 2020. It is an initiative of the *Table de concertation enfance-famille de l'arrondissement LaSalle.*

Randy Mandombo, Manager of Business Development & Marketing, explains that heir mission is to make clothing accessible to low-income families. The clothes that are for sale are either donations from individuals or clothes they receive through a partnership. The partnership allows clothes from stores, such as client returns, damages or unsold stock, to be sold at the thrift store and be diverted from landfills). If the donated clothes have resale value and require repairs, the garments are fixed thanks to their partnership with Mains Utiles, located in Saint-Leonard, Quebec. Main Utiles is a social enterprise that helps immigrant women to fight against isolation with couture and sewing projects.

This partnership not only allows the store to have pieces to resale but also empowers communities of the Island of Montreal.

The thrift store receives between 10 and 15 kilograms of clothes a day, which represents a large amount of clothes to sort through. An average of 60% of the donations can be resold and 40% of them are of lesser quality and are recycled or donated to the Red Cross. They do not throw any clothes away during their sorting process. The thrift store also runs a program that hires individuals with autism to allow social reintegration. These employees work in the store and focus on the operations. This organization not only looks at the environmental impacts but at the social impacts as well. Mandombo explains their mission as following:

> *Ce projet-là a été conçu pour aider les personnes qui sont en difficulté financière dans un premier temps, leur trouver des éléments, des habits de qualité à très bas prix, il a été fait aussi pour lutter contre le gaspillage textile et en même temps permettre la réinsertion sociale à des personnes qui ont des difficultés sociale, mentale, physique ou autre.*
>
> *-Randy Mandombo*

3.2.3 Government Policies

Taxing to Influence Consumer Behaviour

Another way to decrease purchasing would be to directly influence consumers towards purchasing clothes made of better materials and of better quality to reduce the overall footprint of the industry. Clothes will still be bought; however, the goal could be to increase the purchase of clothes made from sustainable materials. One way to encourage certain consumer behaviours could be through pricing. When looking at other examples of behavioural change, plastic bags sold at retailers is a business case to examine.

One article dove into influencing consumer behaviour involving sustainable purchases and analyzed different approaches regarding the elimination of single-use plastic bags.

The goal was to see which policy had a greater impact. The article looks at different countries and their respective policies on eliminating this use. For Denmark, their policy was a tax-based policy targeted at retailers who essentially absorbed the cost. Since consumers were unaffected by this tax, there was no change in their behaviour. Therefore, plastic bags consumption did not change. On the other hand, at sales points in Ireland, an imposition of a €0.15 tax on consumers per plastic bag cut their use by 94%. Not only did the number of bags diminish significantly, but this also allowed '€3.5 billion in extra revenue in its first year of implementation to be spent on environmental projects' (Ritch, Brennan & MacLeod, 2009). This type of policy influences consumer behaviour as they are directly impacted by the cost.

Using the plastic bag example, similar taxes could be used for clothing purchases. It would also be important for this program to not end up being a regressive tax and put a financial burden on consumers part of a lower income bracket. Indeed, it would be hard to tax based on a quantity of clothes since there are some very important differentiating factors between a family purchasing clothes versus an individual who is purchasing a lot of new clothes to keep up with trends. Therefore, taxes could be focused on the quality rather than the quantity, focusing on the materials used or any certifications the retailer possesses.

This way, consumers would be paying more if they wanted to purchase unsustainable pieces of clothing from brands who are not committed to sustainability. Consumers can still shop at their favourite stores; however, they will bear the consequences of their purchases. Inspired by the Pigouvian tax, the negative externalities will be covered by the consumer in the form of a tax, which is currently not the case. Hopefully, a similar model could be used in the clothing industry and could have a similar impact as the single-use plastic bags in stores.

3.3 Clothes' End of Life Processes

Since clothes will remain in circulation and be bought, it is important to simplify the end-of-life processes and review different alternatives for disposal.

3.3.1 Centralized Collection

Mail-in Options

One way to simplify the collection of clothes is to make mail-in options more mainstream. ThredUP, an online resale platform, offers a mail-in option where clients send in their garments and receive payment if the clothes are sold online. Since the consumer is only paid once the garment is sold, this could help encourage consumers to send in pieces of quality and reduce the labour costs associated with going through massive quantities of clothes.

This type of set-up could inspire more clothing companies to do the same, even if they have brick & mortar stores. Indeed, if more and more brands decide to buy back garments at their stores, that means a lot of stops on the consumer journey, especially if they have to make appointments at the store. However, being able to print out the different shipping labels from home and dropping the packages off at the postal office or postal box would alleviate the task of getting rid of clothes since it is only one stop.

Companies can also add educational content on their website to educate the consumer on what they should send back and what condition the clothing must be in. Consumers will also be rewarded, and they can then receive their e-gift card or cash sent to them once the clothing is sold. Therefore, the ThredUP model could be used more often to ease the collection process on the consumer side.

Brands would lose the traffic associated with buy back programs. However, brands could calculate the savings in labour costs (in-store staff), infrastructure and transport (reverse logistics towards a centralized operations unit) then see if the extra traffic is worth these costs. This will also allow in-store staff to focus on the clients coming in for purchasing reasons, capitalize on their selling opportunities and increase the service levels in store. Brands will also have more clothes listed at lower prices which can increase sales and reach a new market.

Can Consignment Model

Having different brands to send back clothes could still represent a level of effort to the consumer. This could still make it difficult for charities and companies to recuperate the pieces and fabric blends they need for their different projects and programs, as the supply is split across many players.

One option could be to create new business models that centralize drop-offs, inspired by the can and bottles consignment model in Quebec, Canada. The goal of the consignment program is to recycle single-use containers to be reused. By doing so, companies can manufacture new products with less resources; 'manufacturing a can from recycled aluminum uses 95% less energy, and up to 40% less water than making a new one from scratch.' The bottles and cans are brought to processing plants for sorting and then sent to recycling plants to remanufacture new products (Consignaction). Not only does this centralize drop off for all single use drinking containers, but it also centralizes operations within the right players, leaving only the purchasing of recycled materials and transformation to the retailers.

Concepts from this business model can be reused in the clothing and textile industry. Consumers could have an account on a mobile app that facilitates the process. They can receive estimates and information on the value of the textiles they want to send it. They can print out their single label and send back all the clothes they want to part ways with. They could then receive compensation in exchange for their clothes, based on the fabric

blend and state of clothing. This will reduce the different sorting of clothes by brands (to know which can be resold versus donated) and reduce the different stops consumers will have to make to the appropriate drop-off locations. This could encourage consumers to adopt these behaviours and this business models which can have

It will also help manufacturers buy recycled materials in a more structured way. For example, Nike will no longer have to take on the responsibilities of collection, recycling and transformation. They can simply purchase the materials they need. This may also help smaller players who wish to use recycled materials that could not cover the costs of the infrastructure required for collection. This can make using recycled materials more accessible.

What is encouraging about implementing a similar business model for clothes, is that it had worked for Eva B a while back. Coghlin, the Director of Eva B, explains that before offering store credits, they offered cash or store credits to the consumer (of a higher amount). She compared the mechanics of the program to the ones of the can consignment program in Quebec. Though they had to stop due to the lack of capacity, she says that it works very well.

> *C'était un modèle qu'on a fait très très longtemps et qu'on a arrêté il y a peut-être 5 ans. On se ramassait avec des files d'attente de 40 personnes pour venir vendre leurs vêtements. Parce que c'était un petit peu comme… Tu sais, si tu ramasses des canettes vides dans la rue, tu vas les rapporter pour 25 cennes. Ben nous autres, on offrait plus que 25 cennes le morceau. Donc pour quelqu'un qui voulait un peu d'argent, il faisait le tour des poubelles, puis il nous amenait ça. Donc on se ramassait avec des files qu'on n'était plus capable de soutenir.*
>
> *-Catherine Coghlin*

The consignment program in Quebec, Canada, has shown great success since its implementation in 2001. An estimated 72% of returnable containers are recovered by these types of programs (Consignaction). Therefore, re-creating a similar program for

textiles could be interesting to investigate further seeing as similar mechanics have been successful.

3.3.2 Accountability

Warranties

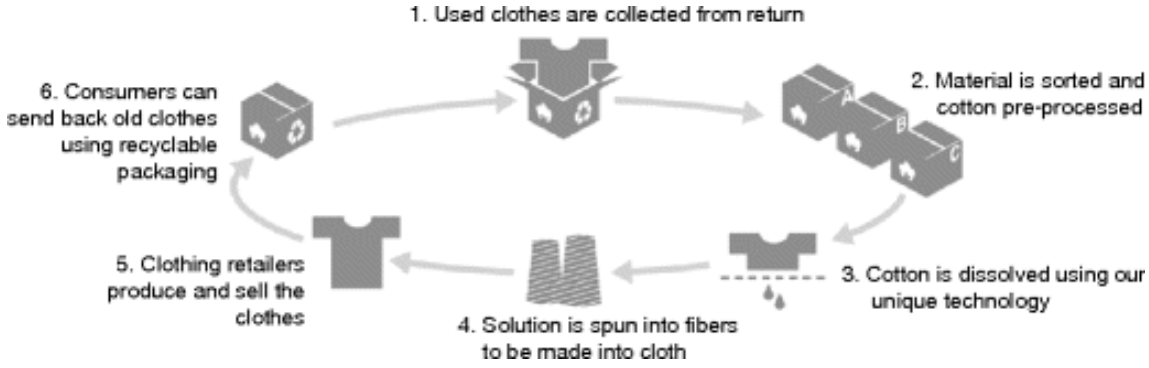
What could be beneficial for the fast fashion industry would be to include the brands and hold them accountable. One program that will be explored is the Extended Producer Responsibility (EPR). The objective of this program is to 'extend to the post-consumer stage of a product's life cycle. EPR shifts responsibility upstream in the product life cycle to the producer (i.e. brand owners, first importers or manufacturers) and away from municipalities and general taxpayers' (Environment Agency Canada).

This type of program already exists for other products such as electronics, appliances, paint, and engine oil. This is also the case for textiles in a few countries. The collection of products at their end of life falls under the responsibility of the producer and they must take charge of the collection sites to retrieve all products to be properly disposed of (Environment Agency Canada). This program is upheld with regulations and by governing bodies, and forces closed-loop strategies and gets companies looking at how to reuse the materials and products.

Countries such as Finland and France have introduced closed-loops strategies. For example, in France, producers, distributors and importers of clothes and footwear must take back their products in France. However, these entities often donate these items directly to charities instead of reusing the materials to create new clothing. This type of program should take these companies to the next level and recycle clothes into new products. This is the case for Finland. Their Relooping Fashion project focuses on collecting garments made of cotton by partnering with the players of the recycling and fashion industries. These garments are then sorted and processed into new fibers and

garments (Niinimaki, 2017). This collaboration makes a circular economy possible since these parties can all contribute to accomplish their mission.

Figure 9 Relooping Fashion project (Relooping Fashion 2016)



Note: Overview of circularity projects in the fashion industry looking at reverse logistics and transformation of materials into a new product.

However, this does require strategic decision-making to see these programs through. These decisions may include reworking the reverse logistics, reviewing what products to create, and marketing these recycled products. Therefore, a major financial burden may be put onto the retailers to make these projects concrete.

3.3.3 Circularity

In the province of Quebec, some examples and ideas offer alternatives for clothes and transform them into new products. Chroma, a company founded in 2012, and Versatile, a company from the 2021 Esplanade's Incubator Cohort, are both examples of innovative ideas in Quebec.

Chroma

Chroma was created by Marianne-Coquelicot Mercier. Her background and training, including her college degree in Fashion Design and her bachelor's in industrial design, allowed her to pursue a project that matched her interest in sustainability:

> *À l'époque, mon intuition était que je connaissais la matière textile pour créer puis en Design Industriel j'allais apprendre à travailler d'autres matériels: le bois, le plastique, le métal. Mais en fait, le baccalauréat en Design Industriel c'est beaucoup plus que ça. C'est une façon de réfléchir. Le processus de design c'est de poser les bonnes questions, de cibler les problématiques, pour ensuite y apporter des réponses. On ne crée pas des produits seulement pour qu'ils soient beaux. On crée des produits pour répondre à quelque chose, à un besoin.*
>
> *-Marianne-Coquelicot Mercier*

This led to the creation of Chroma. Chroma creates felt from recycled clothes, recycling 6 shirts for every square meter of felt produce. Optimizing the transportation network was also key in Chroma; there were only 600 kilometers between the production site and the point of sale as opposed to international supply chains. Chroma partnered up with textile recycling companies to source recycled clothes that were used. The felts do not require additional chemicals and dyes for the hues and for the colors to be produced.

Mercier stressed that understanding who her market was for her niche product was a lesson she learned with her project. The market for Mercier's products was mainly interior designers who worked on residential projects; she was able to work on custom pieces and was able to create products with added value for the customer. A few years ago, when awareness surrounding textiles and their negative environmental impact started to grow, it helped sell a lot of the remaining stock. This demonstrates the impact created by sensitizing the general population on environmental issues. Therefore, promoting innovation and new products could help mitigate the problem of excess textiles and diverting them from landfills.

Versatile

Versatile was born out of Vincent Wilson's concern for the environment. When researching different environmental challenges to find out how he could be part of the solution, he was blown away by the textile industry and the lack of visibility on this issue. Wilson explored many different ideas and found one that caught his attention; find a way to bypass large expensive machinery required to defibrate the clothes, which is the disassembly step, and find an alternative.

Though Wilson is still in the preliminary phases of his business idea, the goal of Versatile is to grind the clothes together to create a substance that could be used for different products. His interest in the circular economy makes him want to create products that could be used not for a second life, but a third one and so forth if the client wants something new. The product could be brought back and could be grinded and remodeled into another product. However, the tests are still being done for product development to understand the output possibilities and build the business model.

Pertaining to his business model, Wilson also explained that understanding who his future client will be is important. He sees his product as an added value for companies who want to highlight their sustainable practices by encouraging this type of project. Understanding if he will partner up with certain clients will be key in making his project scale up and bring in revenue to his business.

Wilson also expressed his desire to go beyond being a recycling company. He believes that educating the consumer and tackling the production is also a key step in mitigating the negative impacts of the industry. He will be adding educational content on his website to help accomplish this goal.

> *On veut pas être juste un produit, on veut être une mentalité. Dans mon site internet, il va avoir des référents à des compagnies et à des choses que je trouve pertinentes. Même des petits trucs au quotidien pour minimiser son impact, juste être conscient […] Il y a une conscientisation à avoir, faut se regarder.*
>
> -*Vincent Wilson*

Both Chroma and Versatile are examples of ways to transform textiles into new products in Quebec. Encouraging this innovation could allow a city or country to become a hub for textile transformation and stimulate textile recycling. Therefore, if a governing body is committed to mitigating this environmental challenge, helping entrepreneurs could be beneficial.

3.3.4 Traceability

Radio Frequency Identification (RFID) tags are a premature solution being explored to improve the traceability of waste management (MacArthur Foundation) By reading the RFID tags, the material blend would be rapidly and automatically shared with the recycling plant. The use of RFID could give value to the recycling parties in the following way:

> *''Integration of CRM (Customer Relationship Management) and remanufacturing strategy (considering consumers' preference and perception on new, remanufactured, or refurbished products) could assist the decision maker to gain insightful knowledge of the market and thus help establish appropriate market and manufacturing strategies.'' (Zhou & Piramuthu, 2013).*

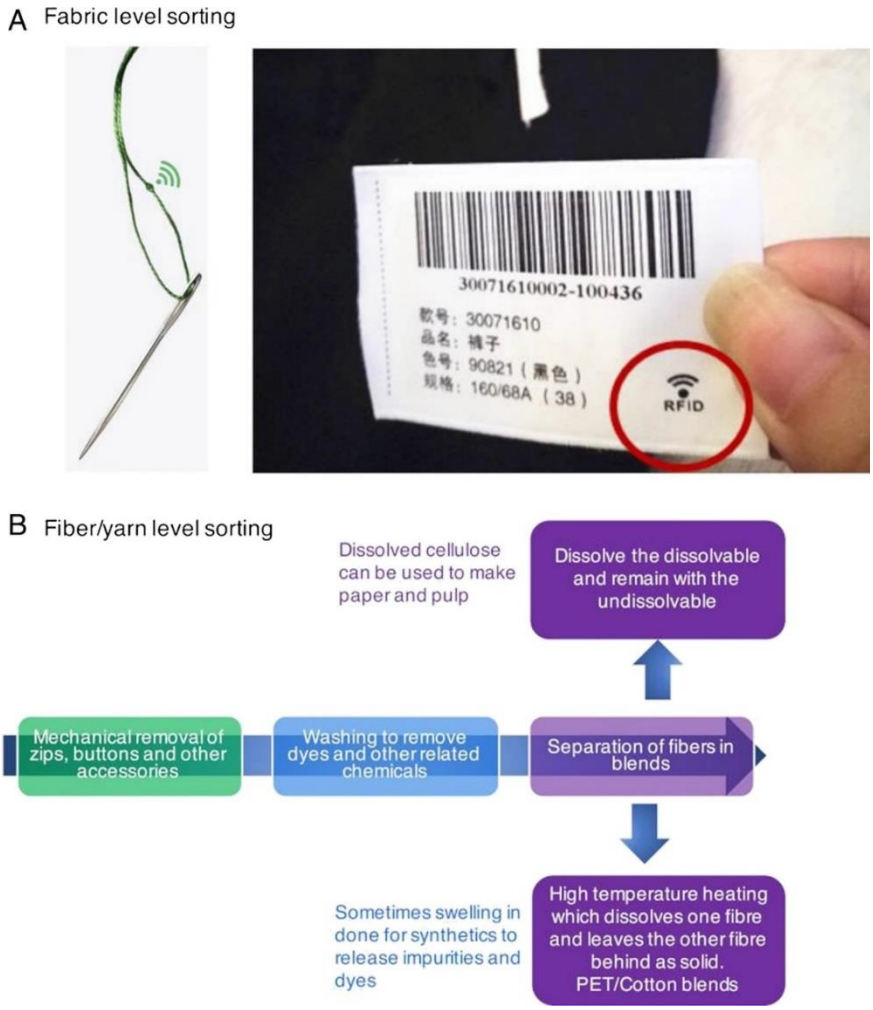
This technology is being piloted with municipal waste items in the UK with the SORT-IT project. This project was introduced with the goal to facilitate recycling and recovery for food and drink packaging manufacturers that are having difficulties to meet their statutory targets for recycled content (Flaherty, 2021).

The use of this technology could be beneficial for clothes as well. They can be added to the clothing and remain active throughout the lifecycle. This would help with the end-of-life processing and sorting. For example, the composition of the fabrics, such as the percentage of each fiber or if any other materials, such as zippers, are on the garment. This could also be beneficial for companies that would have access to big data and for the customers since this can make faster check-outs possible (Chen et al., 2021). This could also help communicate with smart washing equipment to ensure the correct care is given to the clothes.

Funding could be attributed to this topic to evaluate the feasibility and results of this type of technology. If the results are promising, the next step would be to provide funding for businesses to incorporate these technologies into their supply chains. For manufacturers, this would be the use of RFID tagging. For recycling plants, this would be the use of the tag readers and infrastructure required to process the data. This would make the technology accessible to all the necessary partners involved.

Synthetic fibers and their rapid growth are one alarming element to fast fashion due to the difficulty to disassemble and recycle. Therefore, looking at increasing natural and biodegradable fibers would contribute to easier recycling processes. This would also require the implication of governing policies to help companies shift toward better fibers and hold retailers and manufacturers accountable for the environmental cost of their business (Liu et al., 2021). Subsidies could also be designed for research and development. Indeed, the government could stimulate research within their country to explore different fibers and textiles. An example of a subsidy is the Plastic Recycling Investment Tax Credit in the United States. In the state of Colorado, expenses incurred for the development of technology for plastic recycling can be subsidized (Colorado Department of Revenue).

Figure 10 RFID tags (Chen et al., 2021)



Note: Image of an RFID tag alongside the process mapping of the sorting made possible.

However, caution should be used while exploring this option to ensure health and ethics concerns are studied. For example, the tracking and the collection of data of the garments could make some consumers wary of buying clothes.

3.3.5 Collaboration

The fast fashion has brought together different stakeholders to tackle the garments disposal. Some examples of this are recycling companies partnering up with thrift stores. Vestechpro is partnering with Renaissance and Cul de Sac already works with textile recycling companies.

Vestech Pro and Renaissance

The day of the interview with Paulette Kaci, General Director of Vestechpro, was also the day their new strategic partnership with Renaissance was announced. She explained that their project proposal was accepted by the City of Montreal as part of the *Acting to Support the Ecological Transition* program. The Renaissance Social Innovation Project 'aims to create the first consolidated sector in Quebec for the recovery, reuse, repair, reconditioning and recycling of used clothing' (Vestechpro, 2021).

The goal of this partnership is to work on the excess of donations received. Vestechpro will be looking at different alternatives, including technology, to disassemble the clothing to recycle the different pieces, and training to repair and recondition pieces to put back into circulation. This training portion should help tackle 10 tons of textiles and the technological portion will tackle 100 tons of textiles (Vestechpro, 2021).

Cul de Sac and Recycling Companies

Mélissa Turgeon, owner of the thrift store Cul de Sac, has been operating her boutique since 2004. After having different locations on the island of Montreal, she consolidated into one location. Her model is different from the previous models mentioned; her clothes come from her partnerships with recycling companies.

Every month, Melissa goes to the different warehouses to sort through the clothes. The clothes have already been sorted through once by the company. She picks out what she

finds valuable and pays the clothes per pound. She then washes them, repairs them, and steams them and then puts them for sale in her store. For her, this model works best because she can decide what she wants in her store and does not invest too much time in sorting through donations.

This is very beneficial for her business model as the quantity of clothes discarded in donations is high. She can save time and labour costs by opting for this model. For the recycling companies, they have found a client willing to take on second-hand clothes. And overall, the clothes are being diverted from landfills and offered a second life.

3.3.6 The Business Case

Jérôme Cliche is an Industrial development officer for Recyc-Québec, a public organization that is a reference for anything related to waste management in the province of Quebec, Canada. Recyc-Québec aims to have one respondent per material and Cliche was assigned textiles. He spends part of his time learning about this material such as participating in work research committees, and closely following projects in the field that have received funding from Recyc-Québec.

When looking at textile recycling, it is important to understand certain elements that contribute to this field. For example, the costs related to recycling processes and the pricing of a finished product. Cliche explains that the social economy has been a plus for the industry as it allows to cut costs associated with labour, allowing to better price certain materials. One must also investigate the technology required to accomplish recycling; this impacts the market as well.

> *Certains récupérateurs du secteur textile ont accès à de la main-d'œuvre en réinsertion (des gens qui veulent regagner le marché du travail) : cela peut constituer une bonne opportunité, notamment pour l'aspect subvention salariale. Ainsi, cela permet de valoriser des personnes en contexte de travail et potentiellement de réaliser des économies par rapport à de la main d'œuvre traditionnelle. Le secteur de l'économie sociale est donc profitable pour la mise en valeur des textiles en fin de vie*
>
> *-Jérôme Cliche*

Though some buyers are ready to pay a hefty price for certain materials, some materials are not attractive due to the price points. Being able to lower costs can help make certain materials more attractive to buyers and help stimulate the market for them. This is also important for the reality of Quebec which is competing with some major international players who have very low pricing, like China.

However, aside from pricing, it is also key to look at the complex processes. Not only do the clothes have to be sorted by material, but the clothes themselves must be *un-manufactured* since there are different accessories on each piece of clothing. As clothing manufacturing keeps innovating and coming up with new textiles, recycling is not keeping up. Therefore, different textiles can require different technology for its recycling.

> *Le succès d'une chaîne de mise en valeur du textile repose en premier lieu sur l'accessibilité technique et financière de l'approvisionnement (ce qui est récupéré) et en bout de ligne sur l'accessibilité technique et financière des marchés (ce qui est destiné à une 2^{e} vie).*
>
> *-Jérôme Cliche*

Another interesting element to look at is the business case to mobilize municipalities in taking part in waste management. Since municipalities take charge of the landfill and exploitation costs, these often appear as taxes for the citizens. It costs around 100$ to eliminate one ton of waste and there are around 5,000,000 tons. So, for a municipality, even if their waste management represents a small portion of this amount, there are still very high costs to be assumed by the municipality. However, these elimination operations

avoid having to fill up the landfill or increase the size of the landfill, which also represent large financial costs. These costs can sometimes motivate municipalities to find alternatives for waste, such as transformation and recycling.

For textiles, looking at the cost of investing in projects to divert textiles from landfills can be key. To get municipalities on board and review the possibility of selective collection for textiles (special bin for materials, not in the garbage can), it would be interesting to understand the quantity of textiles thrown out and look at the costs the municipality bears. This could help build a business case for municipalities to investigate alternative projects and maybe even fund some projects to eventually decrease their own costs.

This need for a business case is also echoed by Carolanne Thibault. Thibault has almost 10 years of experience in waste management. Having worked in various teams of the company, she has a holistic vision and understanding of the industry. Though their company does not treat textile recycling directly, the interview drew some parallels with it. Her current role involves business development, mainly finding new markets and new geographical locations to explore.

Thibault explains that when looking for new projects, one important factor is to understand two things: the technology and the market. As recycling evolves, more and more materials can be transformed. Technology is also being developed to simplify sorting. This technology can also be modified to add on more materials to recognize and sort, allowing for versatility. When looking at the market, there needs to be a buyer for the recycled purchases. This is what will justify an investment. If there is no business case for the recycling companies, there will likely be no project.

> *Tu sais il y avait le stigma sur les sacs en plastique… que les sacs de plastique ne se recyclent pas. Oui, ça se recycle! Mais les centres de tri font le choix de ne pas le trier parce qu'ils ont pas d'acheteurs, donc pas de marché. […] On avait des clients qui le triaient, je suis allé dans le centre de tri et il avait des ballots. Ils payaient du* storage *parce qu'ils n'étaient pas capables de le vendre. Donc ça dépend aussi des opportunités de transformations de ces matières-là. C'est vraiment une chaîne. Si tu as pas de recycleur qui vont acheter la matière pour la transformer et faire autre chose avec, tu vas pas le trier, tu vas pas investir pour le trier parce que le* business model *ne se fait pas en bout de ligne. C'est vraiment un écosystème étroitement lié.*
>
> *-Carolanne Thibault*

When looking at textile recycling, having markets for the transformed material will be important to help build a business case and encourage entrepreneurs to venture into this industry. Many technologies can be developed; however, it must be clear that there will be a client for it. Therefore, understanding the possibilities of the product, what markets could use the product as well as the marketing of the product is key. Recycling must make sense on an environmental perspective but must also make sense from a business standpoint.

Chapter 4

Discussion

These different interviews and business cases have allowed me to draw certain conclusions regarding the future of the fast fashion industry. When looking at the different business cases in the manufacturing phases, the demand and the garment's end-of-life processes, certain insights and realities were recurring. The following section will explore four insights that are the result of my research that are useful in understanding the sustainability of the fast fashion industry.

4.1 Review of results

4.1.1 All Solutions Are Necessary

> *Il n'y a pas qu'une seule solution… Il faut que toutes les solutions qu'on a envisagées, qu'on les applique! C'est des enjeux qui sont extrêmement complexes.*
>
> *-Marianne-Coquelicot Mercier*

When looking through the different examples and business cases of recycling or resale platforms, it is important to highlight that it is not about prioritizing one approach over the other. It is being able to have both options available for the end of life or a garment. The different interviews showcased their product and how a certain category of clothes were repaired, resold, or recycled. The interviewees also explained what they were able to do with the garments that they couldn't necessarily use in their business model; there is a necessity to have different solutions for the different scenarios of the clothing.

The condition and composition of the garment can impact the different alternatives that exist. Different recycling options will match different garment types. Also, the consumer disposing of the garment can also influence the different paths the clothing can take. The resale option can also offer a financial incentive to the seller or can be a donation to an

organization. This depends on the seller's motivation. For example, Upcycli allows the seller to make money, Eva B allows for a store credit and Friperie Chic & Commode is fueled mostly by donations from consumers. The surplus of some of the boutiques are also donated to other charities or to organizations like the Red Cross. Also, when looking at resale or recycling, there are many possibilities within those spheres. Resale can be on an online platform or in an in-person experience. The seller's preference for technology

For example, there are three potential 'paths' for the garment outlined below that were discussed in the interviews:

- A garment in good shape → Resale or donate
- A garment in mediocre shape → Repair to resale or recycle
- A garment in terrible shape → Recycle & transformation

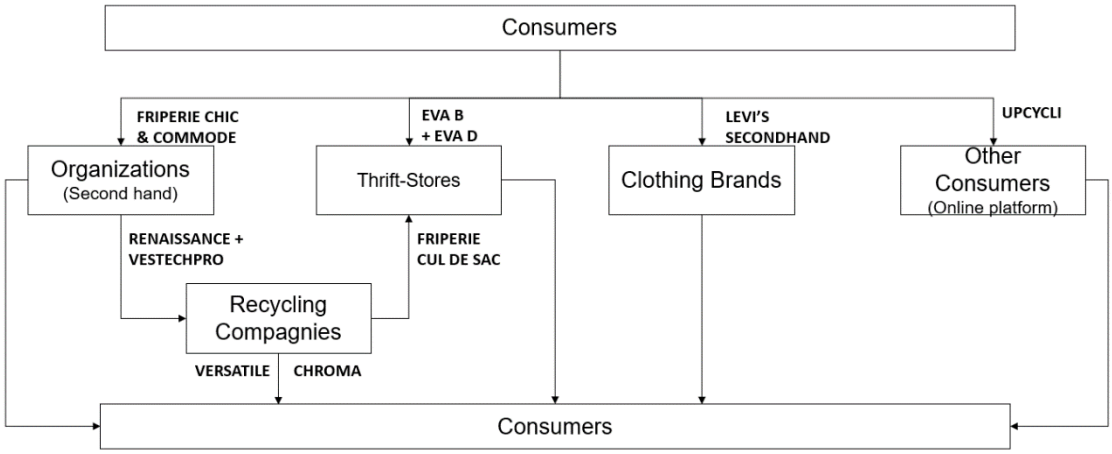
Many different factors explain the different scenarios for the clothing disposal. These factors have an impact on the use of one model over the other is the different materials used in the manufacturing as well as the condition of the garment. It is about finding the best match between that garment and a disposal alternative. The need for variety was also reinforced by Viens from Concertation Montreal who explained this from a business standpoint. She explains that the creators sharing their own experience with projects allowed others to take or leave what worked for them. This highlighted the importance of having different solutions to match different business realities.

Therefore, one of the insights is to highlight that all these different solutions explored are alternatives that apply for different contexts and one approach is not necessarily to be preferred over another.

4.1.2 Structuring Disruption and Innovation

As all these different solutions also highlight many collaborations within the industry. The graph we see below highlights the different partnerships. For example, we have charities giving their excess donations to recycling companies and then we have other second-hand boutiques buying their merchandise from recycling companies. In the long-term, it could be key to understand what can be done to streamline the process or reduce redundancies within the ecosystem.

Figure 11 The Recycling & Resale Ecosystem



Note: Overview of the different collaborations and interactions of different stakeholders based on the field research interviews.

Partnering up with other stakeholders that are outside of reselling and recycling can be very beneficial. Repairing clothes came up in different contexts with different parties. Repairs could help consumers keep their clothes longer and invest in the garment for the years to come. These types of partnerships can help alleviate the quantity of clothes being donated and recycled as well as revalorize the clothes to be resold. That is also a great way to stimulate different actors and help revive certain activities that may have lost traction with the rise of fast fashion.

This ecosystem also highlights an important element that was often brought up with different interviewees: the market. Indeed, as many projects come to life, the market is needed to ensure revenues and its feasibility. The graph also highlights that these partnerships exist because the output of one party is the input to another. Therefore, as new parties and projects come to life, their product must answer the need of another party.

This ecosystem also finishes with consumers, highlighting the necessity of a business case and a market for the finished product. This can be seen through the different interviews. For example, Mercier explained it was one of her lessons from Chroma and Coghlin explained their new clientele targeted by Eva D. In addition, both experts in recycling and waste management also highlighted the importance of a business case. This will help understand the investments in technology, how to lower costs and how to have the right pricing to stimulate the buyers for the materials.

When looking at fast fashion, getting different actors involved and creating these different partnerships and business models is key in understanding its sustainability. It is not one company or one solution that will reduce the impacts of this industry but rather the coming together of all the stakeholders and business models and highlighting their contributions.

4.1.3 Circularity, Life Cycle Analysis and Vigilance

Vigilance and caution are key when moving forward with different solutions and alternatives. With different recycling technologies, resale platforms and projects, it is important not to lose sight of the objective: reducing the negative impacts of the industry and making it sustainable. Throughout these projects, we must not displace negative impacts elsewhere in the supply chain. If clothes are not being sent to landfill, then the solutions of recycling and reselling must not create the same amount of negative impacts elsewhere. For example, using a lot of energy in machinery or using chemicals in recycling processes can be just as damaging to the environment.

Des fois, tu penses que ton modèle d'affaires fonctionne et est écologiquement mieux parce qu'il referme la boucle. Puis là, tu regardes globalement […] ton empreinte écologique mais elle n'est pas si bonne que ça : ce sera meilleur point de vue changements climatiques mais ce sera pire point de vue toxicité des sols. La pensée cycle de vie, via l'analyse cycle de vie, doit être superposée sur la circularité textile pour que ça ait du sens. Comme ça, tu t'assures que oui, boucler la boucle c'est bien et ne crée pas d'effets rebond.

-Isabelle Lessard

Circularity really highlights how all the decisions taken by different parties have an impact on the overall footprint of the industry. A lot of different solutions are being put forward, but we must pinpoint what makes sense for the reality of a city, province or country. This also has an impact because the solutions must fit the resources and capacities of the geographical location where the ecosystem will be built. Once these alternatives are fit for the location, different parties must look at the different impacts and make sure they also make sense for the environment and contribute to sustainability.

4.1.4 'R' is also for Reducing

Il y a quelque chose qui est indéniable. On ne peut pas avoir une mode plus durable si on ne produit pas mieux et qu'on ne réduit pas notre production et notre consommation. C'est quelque chose qui doit absolument être dit. Le Fast Fashion est-ce que ça peut vraiment s'inscrire dans une mode durable? Je n'y crois pas. Certaines solutions en économie circulaire vont permettre de contenir le problème, mais sans réelle réduction de notre consommation des produits mode, il n'y aura pas de réduction des impacts environnementaux. Les impacts ne seront que déplacés.

-Janie-Claude Viens

One important element is reducing. Recycling and resale can help divert from landfills, however, reducing the amount of clothes in circulation is an important aspect. If the

demand doesn't change, there will still be an immense quantity of clothes in circulation. The negative impacts of the manufacturing, the wearing, the disposal will continue. To what degree can the structures currently in place sustain this amount? If year over year, there is a growth in demand, when will these structures run out of capacity?

Therefore, recycling and reselling should be accompanied by mechanisms to change consumer behaviour to avoid getting to points of oversaturation. Consumers need to think about the impact of their purchases. The interviewees that had a business in recycling or reselling all mentioned the importance of also reducing the source of the issue. They are doing their part with post-consumption waste, but they stressed that this was only part of the issue. Consumer behaviour had to change to help alleviate the negative impacts of the industry.

Nevertheless, demand could be displaced towards the second hand. Having different second-hand boutiques that offer different clothes to different segments can help offer alternatives to these consumers. Indeed, the Director of Eva B mentioned that we have enough clothes to dress ourselves for the many years to come. If consumers invest in the second-hand market, it can tackle the quantity of clothes still in circulation.

Educating and shedding light on this issue could help consumers change their habits and look at their consumption of clothes in a more critical light. This will have significant impacts on the fast fashion industry and demand. The industry will have to adapt to this transformation and see how they can still thrive knowing that production may lessen, and consumers are headed towards a different avenue.

4.2 Implications of the Results

After reviewing the recycling and reselling business models that exist or are to come, it seems as though they are the very kryptonite of fast fashion. This paper looked at clothing manufacturing, the demand for these clothes and how decisions across the supply chain affect the recyclability. However, by making changes towards manufacturing of more

sustainable clothes, responsible consumption of clothes and developing technologies that can recycle different fiber composition, it seems to go against what makes fast fashion a success.

Opting for better fibers, shying away from synthetics, and thriving to make better clothing may impact the price and the longevity of the clothing's lifespan. Not only could this impact the cost of producing the goods and eat into the margins, but the higher prices may also discourage consumers from buying as much. The fast-paced consumption created to sustain fast fashion may be slowed with these new changes.

Promoting second-hand clothing and stimulating this market will also divert demand for new clothes towards new markets, which can also impact fashion companies into rethinking their model and product. In addition, if the pricing of new clothing is much higher, due to the changes previously mentioned, consumers may see the attraction of buying second-hand clothes at a cheaper price. As more sensibilization and education is provided to the consumer regarding the disposal of clothes and the impacts of their consumption, that may also contribute to a shift in consciousness which can impact fast fashion as well. Consumers may look to invest in repairs and maintenance to keep their wardrobe in mint condition and keep their clothes longer.

Therefore, the research question regarding recycling and reselling ended up illustrating the paradox that would result from trying to make fast fashion more sustainable. As awareness grows about sustainability and which role consumers play in the future of the planet, there could be some major impacts on the fast fashion industry.

4.3 Limits and Future Research Leads

The interviews tried to target four different categories of individuals. First, it was important to understand the reality of employees or owners of companies related to recycling and reselling clothes. However, there could still be a bias present regarding the understanding and contribution of recycling and resale platforms. Individuals who have

started their own company, work for those companies or work in textiles and waste management may have less of a critic view on the matter if it is their profession. Though I did try my best to target individuals with a critical view, it is important to highlight there is still a possible bias.

The research portion encompassed business cases and analysis from across the planet. However, the field work concentrated on the reality of Quebec and Canada, seeing as the interviewees were from this location. Therefore, the field work illustrates the landscape in Quebec which cannot necessarily be applied universally. Different countries and regions have different realities when it comes to fast fashion and waste management. Some countries could rely heavily on production to make their economy run and others may be importers of the clothes.

This paper also focused on the environmental impacts of fast fashion. It did not investigate the social impacts of fast fashion. Indeed, other issues including poor working conditions or the impact of the environment on communities where manufacturing is concentrated was not looked at. Indeed, sustainability does not rely only on the environmental aspects but also on social elements. Therefore, moving forward, research could also look at ways this industry impacts society and see if any recommendations can be made.

However, the future of textiles in Quebec is constantly transforming. Different projects and partnerships are unfolding to tackle the issue of textiles in the province and studying this evolution could bring great insights for industrial changes to better meet sustainability objectives. Initiatives such as Fibershed Quebec and the Renaissance Social Innovation Project could be great business cases to understand change management, collaboration and innovation that can be applied to other industries that may undergo similar transformations.

Conclusion

The research question was the following: Fast Fashion: Do recycling and Reselling Allow its Sustainability? The paper investigated different elements that contributed to the negative impacts such the manufacturing, the growing high demand, and the different recycling processes.

The interviews and business cases shed light on the solutions that exist for these three elements. By producing more durable clothes (fibers & design) that are easier to recycle or dispose of, by reducing demand for new clothes by encouraging repairs and second-hand purchases, and by investing in technologies that allow for circularity, the negative impacts of this industry could be diminished. However, these very business decisions could have major impacts on the industry. Costs and prices may increase, demand may decrease, and certain recycling processes could be just as harmful to the environment. Therefore, looking at the industry's sustainability and different solutions allowed to highlight the paradox.

What was also important in this research paper was the importance of having a shift in consumer behaviour and educating consumers on the impact of their purchases. Growing consumption still needs to come to a halt, regardless of alternatives related to clothing recycling and reusing. As the urgence to help fight climate change continues to grow and our desire to innovate and do better, we must not lose sight of the sources of our problems: our behaviour.

Bibliography

About CFDA. (n.d.). Retrieved from https://cfda.com/about-cfda/history#!

Archive. How It Works - Archive: Reclaim Resale. (n.d.). Retrieved from https://www.arch iveresale.co/how-it-works

Bick, R., Halsey, E., & Ekenga, C. C. (2018). The global environmental injustice of fast fashion. *Environmental Health, 17*(1). doi:10.1186/s12940-018-0433-7

Bureau of Labour Statistics, USA. The United States and the global market. (n.d.). Retrieved from https://www.bls.gov/opub/btn/volume-9/international-cotton-trade-and-causes-of-price-volatility-in-the-united-states.htm

Buzzo, A., & Abreu, M. J. (2018). Fast Fashion, Fashion Brands & Sustainable Consumption. *Textile Science and Clothing Technology Fast Fashion, Fashion Brands and Sustainable Consumption,* 1-17. doi:10.1007/978-981-13-1268-7_1

Canada Environment Agency. (2017, August 14). Government of Canada. Retrieved from https://www.canada.ca/en/environment-climate-change/services/managing-reducing-waste/overview-extended-producer-responsibility.html

CDPQ. (2021, October 05). CDPQ announces its new climate strategy. Retrieved fromhttps://www.cdpq.com/en/news/pressreleases/cdpq-announces-its-new-clim ate -strategy

CFA Institute. ESG Investing and Analysis. (n.d.). Retrieved from https://www.cfainstitute. org/en/research/esg-investing

Chen, X., Memon, H. A., Wang, Y., Marriam, I., & Tebyetekerwa, M. (2021). Circular Economy and Sustainability of the Clothing and Textile Industry. *Materials Circular Economy, 3*(1). doi:10.1007/s42824-021-00026-2

Claudio, L. (2007). Waste Couture: Environmental Impact of the Clothing Industry. *Environmental Health Perspectives, 115*(9). doi:https://doi.org/10.1289/ehp.115-a449

Colorado Department of Revenue. (n.d.). FYI Income 56 PLastic Recycling Investment Tax Credit. Retrieved from https://tax.colorado.gov

Concerntation Montréal; “À Propos.” *Concertation Montréal* https://concertationmtl.ca/a-propos/.

Consignaction. (2019, September 02). Did You Know? Retrieved from https://consignaction.ca/en/did-you-know/

Craighill, A. L., & Powell, J. C. (1996). Lifecycle assessment and economic evaluation of recycling: A case study. *Resources, Conservation and Recycling*, *17*(2), 75-96. doi:10.1016/0921-3449(96)01105-6

Curtis, A., & Hansson, A. (2019). Examining the Viability of Corporate Recycling Initiatives and Their Overall Environmental Impact: The Case of Nike Grind and the Reuse-A-Shoe Program. *Case Studies in the Environment*, *3*(1), 1-7. doi:https://doi.org/10.1525/cse.2019.001974

Debter, L. (2021, January 14). Poshmark IPO: Resale Is Retail's New Big Thing, But Its Customers Don't Come Cheap. Retrieved from https://www.forbes.com/sites/laurendebter/2021/01/13/poshmark-online- thrift-store-ipo/?sh=3ed2a6711352

Diddi, S., & Yan, R. (2019). Consumer Perceptions Related to Clothing Repair and Community Mending Events: A Circular Economy Perspective. *Sustainability*, *11*(19), 5306. doi:10.3390/su11195306

Ellen MacArthur Foundation (n.d.). *A New Textiles Economy: Redesigning Fashion's Future* (Publication). Retrieved from https://emf.thirdlight.com/link/2axvc7eob8zx-za4ule/@-/preview/1?o

Fibershed Canada. We're building a regional fibre system centered around local fibres, local dyes, and local labour. (n.d.). Retrieved from https://www.uppercanadafibreshed.ca/

Flaherty, N. (2021, August 02). UK project to tag plastic waste with RFID. Retrieved from https://www.eenewseurope.com/news/uk-project-tag-plastic-waste-rfid

Friperie Chic & Commode: Montréal - Lasalle. (n.d.). Retrieved from https://www.friperiechicetcommode.com/

Ha-Brookshire, J. E., & Hodges, N. N. (2008, November 26). Socially Responsible Consumer Behavior: Exploring Used Clothing Donation behaviour. Retrieved from https://journals.sagepub.com/doi/10.1177/0887302X08327199

Hamari, J., Sjöklint, M., & Ukkonen, A. (2015). The Sharing Economy: Why People Participate in Collaborative Consumption. *Journal of the Association for Information Science and Technology.* 67-9. doi: https://doi.org/10.1002/asi.23552

Joshi, J., & Chowdhury, A. (2021). Creating Products from Textile Waste Generated During Fabric Cutting Stage in the Garment Production Process. *Advanced Manufacturing Systems and Innovative Product Design Lecture Notes in Mechanical Engineering,* 79-91. doi:10.1007/978-981-15-9853-1_8

International Energy Agency. (n.d.). Oil – Global Energy Review 2021 – Analysis. Retrieved from https://www.iea.org/reports/global-energy-review-2021/oil#abstract

Kadolph, S. J., & Marcketti, S. B. (2017). *Textiles*. Boston: Pearson.

Kruesi, G. (2021, February 22). Soil-to-Soil. Retrieved from https://www.chelseagreen.com/2019/soil-to-soil/

La Petite Robe Noire. Retrieved from https://www.lapetiterobenoire.ca/boutique
Leibowitz, D., & Croke, L. (2020). *CFDA Guide to Sustainable Strategies*. Retrieved from https://cfda.com/resources/sustainability-resources

Les cahiers du développement durable (n.d.). L'analyse du cycle de vie. Retrieved from http://les.cahiers-developpement-durable.be/outils/analyse-du-cycle-de-vie/

Levi's SecondHand. (n.d.). Retrieved from https://www.secondhand.levi.com/trade-in

Liu, J., Liang, J., Ding, J., Zhang, G., Zeng, X., Yang, Q., . . . Gao, W. (2021, January 03). Microfiber pollution: An ongoing major environmental issue related to the sustainable development of textile and clothing industry. Retrieved from https://link.springer.com/article/10.1007/s10668-020-01173-3

Lululemon. (n.d.). Trade In Gear for Resale. Retrieved from https://shop.lululemon.com/story/like-new/

Lou, C., & Yuan, S. (2019). Influencer Marketing: How Message Value and Credibility Affect Consumer Trust of Branded Content on Social Media. *Journal of Interactive Advertising, 19*(1), 58-73. doi:10.1080/15252019.2018.1533501

Martinez-Pardo, C. & Krueger, F. "2019 Pulse of the Fashion Industry." *BCG Global*, 1 Jan. 2019, https://www.bcg.com/2019-pulse-of-the-fashion-industry.

Ministère de l'Économie et de l'Innovation. (2020, February). Ministère de l'Économie et de l'Innovation. Retrieved from https://www.economie.gouv.qc.ca/bibliotheques/en-entreprise/diminuer-limpact-environnemental-de-mon-entreprise/ecoconception-des produits-et-services/

Nike Grind: Changing the Game From the Ground Up. (n.d.). Retrieved from https://www.nikegrind.com/

Niinimaki, K. (2017). Chapter 8: Fashion in a Circular Economy. In *Sustainability in fashion: A cradle to upcycle approach* (pp. 151-169). Basingstoke: Palgrave Macmillan.

Palacios-Mateo, Cristina, van de Meer Y. & Seide, G. "Analysis of the Polyester Clothing Value Chain to Identify Key Intervention Points for Sustainability." *Environmental Sciences Europe*, vol. 33, no. 1, 2021, https://doi.org/10.1186/s12302-020-00447-x.

Park, H., & Armstrong, C. M. (2019). Is money the biggest driver? Uncovering motives for engaging in online collaborative consumption retail models for apparel. *Journal of Retailing and Consumer Services.* doi: https://doi.org/10.1016/j.jretconser.2019.05.022

Peters, G., Li, M., & Lenzen, M. (2021). The need to decelerate fast fashion in a hot climate – A global sustainability perspective on the garment industry. *Journal of Cleaner Production, 295*, 1-10. doi:https://doi.org/10.1016/j.jclepro.2021.126390

Phillips, M. (2021, June 09). Exxon's Board Defeat Signals the Rise of Social-Good Activies. Retrieved from https://www.nytimes.com/2021/06/09/business/exxon-mobil-engine-no1-activist.html

Poshmark Canada Inc. (n.d.) Seller Fee Policy. Retrieved from https://poshmark.ca/fee_policy

Poshmark Canada Inc. “How Does Poshmark Work?” *What Is Poshmark.* https://poshmark.ca/what_is_poshmark.

Rent the Runway Plans: Ways to Access the Dream Closet. (n.d.). Retrieved from https://www.renttherunway.com/plans

Ritch, E., Brennan, C., & MacLeod, C. (2009, April 06). Plastic bag politics: Modifying consumer behaviour for sustainable development. Retrieved from https://onlinelibrary.wiley.com/doi/full/10.1111/j.14706431.2009.00749.x?casa_token=nxLzQGAF_tcAAAAA:mk1ET9zWiETpkupeO-RTR4YLYyLLofcBYRhctW3tD-p4oPc_azbzfnG1OnxReMh-q6QaK8QvPTESp7rniw

Roser, M., Ritchie, H., & Ortiz-Ospina, E. (2013, May 09). World Population Growth. Retrieved from https://ourworldindata.org/world-population-growth

Romelaer, P. (2005). «L'entretien de recherche.» Chapitre 4 in: Méthodes & Recherches. Louvain-La-Neuve, Belgique : Boeck Supérieur. Pages 101-137 de 440 pages. ISBN : 9782804147112

Rubber - Nike Grind Materials. (n.d.). Retrieved from https://www.nikegrind.com/rubber/

Sewport. (n.d.). What is Polyester Fabric: Properties, How its Made and Where. Retrieved from https://sewport.com/fabrics-directory/polyester-fabric

Shirvanimoghaddam, K., Motamed, B., Ramakrishna, S., & Naebe, M. (2020). Death by waste: Fashion and textile circular economy case. *Science of The Total Environment, 718*, 137317. doi:10.1016/j.scitotenv.2020.137317

Shopify (2021, May 28). Get Seen on IG: 370 Top and Trending Instagram Hashtags to Increase Likes and Follows. Retrieved from https://www.shopify.com/blog/instagram-hashtags

Statista Research Department, & 15, F. (2021, February 15). Uber: Net revenue worldwide 2013-2020. Retrieved

from https://www.statista.com/statistics/550635/uber-global-net-revenue/

Taylor, L. D. (2009). Price and Income Elasticities Estimated from BLS Consumer Expenditure Surveys and ACCRA Price Data: Some Preliminary Results. *Consumer Demand in the United States,* 107-126. doi:10.1007/978-1-4419-0510-9_6

Textiles - Nike Grind Materials. (n.d.). Retrieved from https://www.nikegrind.com/textiles/

Transcontinental Textile Recycling. (2020). When waste has value, it stops being waste. Retrieved from http://www.transtextile.com/index.html
ThredUP Inc. (2021, June). 2021 Fashion Resale Market and Trend Report. Retrieved from https://www.thredup.com/resale/#size-and-impact

TVA Nouvelles. (2021, July 19). Des dons dérangeants pour les organismes de bienfaisance. Retrieved from https://www.tvanouvelles.ca/2021/07/19/des-dons-derangeants-pour-les-organismes-de-bienfaisance?fbclid=IwAR18evALelS9zyd0EwNJekn9TIp_L21BXTSz3MQ0NQR7D5oqBuvggCgZcM

UN Alliance for Sustainable Fashion. *Home*. (2021, July 08). Retrieved from https://unfashionalliance.org/

United Nations, Environment Program. (2019, March 14). UN Alliance For Sustainable Fashion addresses damage of 'fast fashion' [Press release]. Retrieved from https://www.unep.org/news-and-stories/press-release/un-alliance-sustainable-fashion-addresses-damage-fast-fashion

Vadicherla, T., Saravanan, D., Ram, M. M., & Suganya, K. (2016). Fashion Renovation via Upcycling. *Textile Science and Clothing Technology Textiles and Clothing Sustainability,* 1-54. doi:10.1007/978-981-10-2146-6_1

Vestechpro. (2021, October 22). Vestechpro, Apparel Research and Innovation Center, has joined forces with Renaissance, a leader in the Quebec social economy. Retrieved from https://vestechpro.com/en/news/ticket/vestechpro-scientific-partner-of-the-Renaissance-project-for-the-reduction-reuse-and-recycling-of-post-consumer-clothing-in-montreal/

Vestechpro. École d'été. (n.d.). Retrieved from https://vestechpro.com/fr/services/detail/ecole-dete/

Ville de Montréal. (2020, December). Plan climat 2020-2030 (Publication). Retrieved from https://montreal.ca/articles/plan-climat-montreal-objectif-carboneutralite-dici-2050-7613

Yee, L. W., Hassan, S. H., & Ramayah, T. (2016). Sustainability and Philanthropic Awareness in Clothing Disposal Behavior Among Young Malaysian Consumers. *SAGE Open, 6*(1), 215824401562532. doi:10.1177/2158244015625327

Zamani, B., Svanström, M., Peters, G., & Rydberg, T. (2014). A Carbon Footprint of Textile Recycling: A Case Study in Sweden. *Journal of Industrial Ecology, 19*(4), 676-687. doi:10.1111/jiec.12208

Zhou, W., & Piramuthu, S. (2013). Remanufacturing with RFID item-level information: Optimization, waste reduction and quality improvement. *International Journal of Production Economics, 145*(2). doi:https://doi.org/10.1016/j.ijpe.2013.05.019

Appendix 1

Themes	Questions	Follow-up cues or questions
Background	What is your current position at the company?	Years, milestones, team members, main tasks to overseen
	Could you desribe any projects you are proud of?	Buy-back, technology, recycling, resale, online platform, brick&mortar
	What influenced you to join or to start the organization?	Education, values, specific project
Strategy & Influences	Which services are offered by your firm or your individual self?	Trends, regulation, mission, competition
	What does the business model look like?	Overview, main divisions, suppliers
	Who is your main market?	Profile, persona, any quantitative data available
	Which factors have an impact on the firm's strategic decision-making?	Environmental, financial, political, technological
	Which partnerships are crucial in your business?	
Projects	What is an example of a project related to clothing recycling or resale?	Partnerships, overall processes
	What influenced the organization to start these intiatives-projects-mission?	Competition, first-movers advantage, financial gains
	What are some of the costs associated to these projects?	
	How did you impact your industry with your projects?	Results, collaboration, ripple effect
Long-term commitments	How do you picture your industry playing a hand in helping solve this issue in the long-term?	
	Has your firm made any long-term commitment, and if so, which ones?	
	What would be the driving factor in helping you accomplish these long-term objectives?	
General	How do you view your project-mission-organization fitting into fast fashion's sustainability?	Financial support, R&D, partnerships