Refashioning the industry: Exploring the transition of women's apparel brands to the circular economy in Montreal

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Abstract

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Faiqah Ahmed

Over the last few decades, the fashion industry has evolved from providing well-conceived haute couture collections to the production of trendy, mass-produced, low-priced apparel, with reduced lead times. This consumption of 'throwaway fashion', at an alarming rate, has yielded extensive environmental and social detriments, thereby warranting industry reform and accountability. Driven by the tenets of sustainable development, brands within the fashion industry have since advanced to incorporate values that balance profits, people, and planet. As the circular economy gains traction, globally, to tackle sustainability challenges across industries, this research conducts a case study to explore the implementation of circularity strategies within the sustainable fashion industry in Montreal. Guided by Québec Circulaire's Circular Economy Framework, practices employed by 90 sustainable apparel brands in Montreal, are identified and analysed to ascertain alignment with different circularity orientations and strategies. We found that a large number of sustainable brands in Montreal adopt practices that orient towards *rethinking* the extraction and use of virgin resources rather than *optimising* the use of extracted resources. They do so by employing a mix of strategies including eco-design, responsible procurement and consumption, and operations improvement. Further in-depth interviews conducted with 12 brands also revealed contextual factors that influence the transition of the industry to a CE model, including local culture and community, industrial and supply chain network, access to raw materials and skilled workforce, support from the government, and the cost of living in Montreal.

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Introduction

Watching my friend's young son returning from a play date with an icecream-soiled t-shirt and attempting to toss it in the trash straight away, seemed indicative of a larger societal challenge. When your shirt costs less than your parents' coffee run, does the disposability not seem almost justifiable? Hailing from Pakistan, a country with cotton as its major cash crop and export (Rana et al., 2020), yet proportionate impoverishment among cotton farming communities, I was intrigued enough to study the true cost of fashion— economic, social, and environmental — for producer and consumer countries alike. What began as a term paper in a graduate course, exploring institutional environments and corporate social irresponsibility, led me to a more focused research agenda for this thesis.

A basic 100% cotton t-shirt may be retailed for less than $10, but hidden costs, in terms of water and energy consumption and living wages for garment workers, must be taken into consideration for responsible consumerism. Production of one t-shirt is reported to utilise 2,700 litres of water, equivalent to an individual's daily drinking needs for two years (Ecologos Environmental Organization, 2020). With its annual usage of approximately 79 billion cubic metres globally, the fashion industry's social and environmental impact is particularly perilous since much of the raw material and apparel production is situated in areas of freshwater stress (Global Fashion Agenda and Boston Consulting Group, 2017; Pal & Gander, 2018). Additionally, through the lifecycle of a t-shirt— farming and processing of cotton fibers, dyeing of yarn, knitting and spinning of textile, manufacture of the garment, post-purchase laundering, and disposal of the item— a total of up to 109MJ of energy is consumed (Allwood et al., 2006).

The glamorous fashion industry, with current global manufacturing valuation of USD 2.4 trillion, has been cited as a high-impact industry in terms of social and environmental damage (Pal & Gander, 2018; United Nations Alliance for Sustainable Fashion, n.d.). The global apparel industry produces close to 150 billion clothing items per annum, which has roughly doubled since 2000 (McFall-Johnsen, 2020; Remy et al., 2016). Apparel consumption has, in tandem, grown exponentially in the past two decades, with approximately 107 billion new items purchased worldwide in 2016 (Common Objective, 2018). It is, however, imperative to acknowledge that while consumption has increased manifold since 2000, individual retention of

clothes has declined by almost 50%, with a truckload of textiles disposed or incinerated every second (Ellen MacArthur Foundation, 2017; McFall-Johnsen, 2020).

Amidst the rise and prevalence of fast fashion, centered on accelerated introduction and diffusion of trendy apparel, there is spirited conversation about its long-term externalities, including, exorbitant levels of toxic emissions, carbon footprint, landfill deposits, and exploitative labour practices. A growing recognition of the industry's ecological footprint and social harm has provided an impetus for a notable increase in conscious fashion brands as well as conventional brands incorporating sustainable values (see Fletcher, 2010; Pedersen et al., 2018; Todeschini et al., 2017). Sustainability, introduced as a balanced focus on profits, people, and planet, has increasingly been promoted towards industrial development that ensures inter-generational equity (Geissdoerfer et al., 2017; UN Secretary General, 1987). Specifically, within the fashion industry, the United Nations Alliance for Sustainable Fashion promotes policies and processes within the value chain that minimise negative externalities and contribute to the attainment of the Sustainable Development Goals (SDGs), including reduced inequalities (SDG #10), responsible consumption and production (SDG# 12), and climate action (SDG # 13) (United Nations Alliance for Sustainable Fashion, n.d.; United Nations Development Programme, n.d.).

To counter the sustainability issues inherent within a conventionally linear model of production, consumption, and disposal i.e., resource depletion and waste generation, the circular economy, is being endorsed (Gazzola et al., 2020; Henninger et al., 2021). The circular economy (CE) is a sustainability framework, based on a restorative approach, that focuses on end-of-life reintegration and regeneration (Abu-Ghunmi et al., 2016; Geissdoerfer et al., 2017). As regulations and policies continue be to be devised and tested across the world, for the adoption of the circular economy, Quebec took the lead on this transition in North America in 2014 (Québec Circulaire, n.d.-e). The Government of Quebec has since founded a multistakeholder platform—Québec Circulaire— to support sustainable economic growth and facilitate the transition to the circular economy in the province (Government of Quebec, n.d.; Québec Circulaire, n.d.-d). To do so, the organisation has developed a Circular Economy Framework that presents twelve circularity strategies, that can be tailored and implemented across industries, to *rethink* and *optimise* the use of resources (Québec Circulaire, n.d.-b).

Statistics show that Quebec hosts close to half of the country's fashion industry-related jobs, of which 70% are situated in Montreal (Martini & Lifson, 2013). Montreal's fashion industry dates back to the 1820s, and has steadily persevered to its current status as Canada's largest and North America's third largest apparel manufacturing centre (Écomusée du fier monde, n.d.; Martini & Lifson, 2013). For the purpose of this research, Montreal provides a fitting context, given the province's emphasis on the transition to a CE model, the fashion industry's prominence as a high-impact sector, and the growing list of sustainable apparel brands locally.

The existing literature adequately establishes the importance of the circular economy as a closed loop system enabling the "decoupling of economic growth from environmental impacts" (Ghisellini et al., 2016, p. 24). However, research is scant on how these circularity strategies are operationalised across the supply chain, including opportunities and barriers to implementation within different contexts (Brydges, 2021). Brydges (2021) has also asserted that CE principles manifest differently in each industry, i.e., the nature of business and contextual dynamics will determine the choice and effectiveness of circularity strategies implemented. Within the fashion industry, specifically, CE literature has focused on strategies that target the consumption and disposal stages of the product lifecycle, such as take-back programs, swapping, repairing, second-hand shopping, and material recycling (Henninger et al., 2019; Machado et al., 2019; Pedersen et al., 2019; Sandvik & Stubbs, 2019). However, despite the highest environmental impact reported at the extraction and manufacture stages of the clothing lifecycle, CE strategies targeting these stages are under explored and contested (Brydges, 2021; Roos et al., 2016; Rosa et al., 2019). Researchers have also criticized that the undue circularity focus on one part of the clothing lifecycle undermines the interconnectedness and complexity of fashion supply chains (Bick et al., 2018; Brydges & Hanlon, 2020).

Thus, this study responds to the call for case study research in different geographic and industrial contexts (Brydges, 2021), and contributes to the growing literature by understanding the implementation of CE strategies within the sustainable fashion industry of Montreal. To that end, this thesis is guided by two research questions:

1. What circular economy strategies and practices are sustainable fashion brands in Montreal implementing?

2. What contextual factors enable or create barriers to the adoption of circular economy strategies within the sustainable fashion industry of Montreal?

Through a case study design, using archival and interview data, this study seeks to identify sustainability practices employed by apparel brands in Montreal, across the product lifecycle. Guided by the CE framework, sustainability practices for each brand would be categorised as per the circularity strategies and orientations, to help gauge overall industry contribution to Quebec's circularity directive. Additionally, this research study aims to identify brand-specific and industry-specific considerations and challenges associated with the implementation of a circularity strategy. The broad significance of this study lies in understanding how the CE framework is operationalised within Montreal's fashion supply chains, providing valuable policy insights that could be cemented in the existing environment or replicated in other industries and geographical contexts.

The remaining sections of this thesis are structured as follows. Section 2 includes a review of literature and conceptual framework used to ground this research. Section 3 covers the methodology used to answer the research questions. Section 4 presents the findings from this research study. Finally, Section 5 discusses the findings in light of the literature, outlines managerial and policy implications, identifies limitations to this research study, and concludes by proposing areas for future research.

Literature Review

Towards fast fashion — Evolution of the global fashion industry

The apparel manufacturing and purchase lifecycle, conventionally, was centered around a fixed yearly program of trade fairs and fashion shows, that drove a "two-season approach" to well-forecasted product lines, with long lead times (Barnes & Lea-Greenwood, 2006, p. 2; Radhakrishnan, 2015). However, increased information and media access to the latest trends has hastened consumer demand (Barnes & Lea-Greenwood, 2006). The system of planned forecasting and fashion buying has been replaced with a multi-season format with rapid turnover of fashion introduction, maturation, and obsolescence (Bhardwaj & Fairhurst, 2010). Correspondingly, business focus shifted away from high-value product development and design distinctiveness onto brand responsiveness, shortest possible lead times, and reduced costs—a fast fashion model (Bhardwaj & Fairhurst, 2010).

Fast fashion, a disruptive and increasingly popular business model, is characterised by a high turnover of trends, mass production, democratisation of high-end prêt-à-porter at lower retail prices, and increased speed to market (Bhardwaj & Fairhurst, 2010; Sull & Turconi, 2008). With approximately 12 to 24 collections a year, high street retailers such as Zara and H&M are quickly adopting runway fashion and mass-delivering renditions of designer clothing at a fraction of the price (Barnes & Lea-Greenwood, 2006; McFall-Johnsen, 2020).

Ready access to information and trends via the internet, coupled with an improvement in relative socioeconomic conditions, has allowed customers to browse more options and purchase more often (Bhardwaj & Fairhurst, 2010). With the steep reduction in prices of fast fashion garments, Generation Y consumers have been reported to purchase a higher number of lower-priced and lower quality clothing items, compared to Generation X customers who exhibited preference for a lower number of high-quality clothes (Crewe & Davenport, 1992; Muthu, 2015). Global apparel consumption is forecasted to further climb by 63% from $62 million in 2017 to $102 million in 2030 (Global Fashion Agenda and Boston Consulting Group, 2017).

The reorientation of apparel brands, towards fast fashion, has mandated efficient information management, supply chain restructuring for optimised collaboration, and infrastructure development for agility to rapidly shifting customer demands (Barnes & Lea-Greenwood, 2006; Bhardwaj & Fairhurst, 2010; Bruce et al., 2004; Christopher et al., 2004). The

fashion supply chain has been streamlined through the use of information technology tools for information sharing (Bhardwaj & Fairhurst, 2010; Bruce et al., 2004), and vertical integration of clothing design and manufacture with retail outlets for real-time 'collaboration' with consumers, e.g., Benetton and Zara (Sull & Turconi, 2008). Fast fashion brands have also significantly lowered costs by outsourcing the labour-intensive production process to subcontractors in emerging economies (Sull & Turconi, 2008).

Externalities

Whilst fast fashion has revolutionised consumption patterns, supply chains, and manufacturing infrastructure within the industry, it has also yielded detrimental social, economic, and environmental externalities (Gazzola et al., 2020). Unceasing negative impact across the value chain has necessitated conversations regarding the planet's carrying capacity and the fashion industry's social accountability (Gazzola et al., 2020; Pookulangara & Shephard, 2013).

Environmental issues. The apparel and textile industry has been identified as one of the leading polluting industries, accounting for approximately 10% of total carbon emissions worldwide (Zaffalon, 2010). Accelerated manufacturing, in fast fashion models, significantly increases greenhouse gas emissions, solid waste accumulation, and toxic effluents; this threatens ecosystems and biodiversity, reduces water, air, and soil quality, and depletes Earth's resources drastically (Allwood et al., 2006).

At the source, cotton and polyester fibers dominate as primary inputs for 80% of global textile production (Baugh, 2008). Although wholly organic, typical cotton production uses exorbitant levels of water and agrochemicals (Claudio, 2007; Draper et al., 2007), and the production of synthetic polyester fibers generates environmental risks associated with extraction and refinement of petrochemicals (Myers & Stolton, 1999). On the manufacturing front, Zaffalon (2010) has reported that the annual worldwide production of 60 billion kg of fabric requires approximately 1 trillion kilowatt hours of electricity. This is a concern because, based on existing energy industry composition, 87% of global energy demand is fulfilled through crude oil, natural gas, and coal (BP, 2013; Claudio, 2007). Dyeing, drying, and finishing of fabric also utilise high levels of chemicals and water, adding to the environmental burden (De Brito et al., 2008). Given the concentration of clothing manufacturing units in the Global South, environmental implications have also escalated at the retail and distribution phase of the supply chain (Draper et al., 2007). The carbon footprint issue, resulting from global transport, has been exacerbated due

to the normalisation of air freight in fast fashion supply chains that aim for speed to storefront (Barnes & Lea-Greenwood, 2006). Excessive packaging and marketing materials for retail also contribute to the piling solid waste in landfills (Connell, 2015).

Finally at the consumption stage, post-purchase care, including high temperature washing and drying, contributes to almost 80% of a garment's carbon footprint, including water consumption and use of laundry chemicals that harm human health and the environment (Bajpai & Tyagi, n.d.; Business for Social Responsibility, 2009; Draper et al., 2007). Further, customers have been purchasing and discarding 'throwaway fashion' at a rapid pace, sending almost 1 billion kg of textile waste to landfills every year; this is in addition to the large amounts of unsold inventory dumped or incinerated (Pal & Gander, 2018; Pookulangara & Shephard, 2013). While the average number of uses per garment has reduced by over 36% from 2000 to 2015, indicating the increased rate of disposal before end-of-life, only 1% of disposed clothing is recycled— an estimated loss of USD 100 billion worth of raw materials per annum (Ellen MacArthur Foundation, 2017).

Social issues. While previous studies have shown that jobs in the apparel industry contribute to the uplift of socio-economic status of individuals— a 24% increase in purchasing power on average, disproportionately more have demonstrated the negative repercussions of fast fashion employment (Nicita & Razzaz, 2003). Following the expiration of the WTO Agreement on Textiles and Clothing and consequent trade liberalisation, production centres of the fashion industry have moved out of industrialised countries such as United States, United Kingdom, and Germany and into developing nations such as China, India, and Bangladesh (Radhakrishnan, 2015). However, developing nations have witnessed deteriorating social security due to a clothing glut in developed marketplaces— e.g., Kenya has experienced an alarming decline in apparel industry employment from 500,000 in the 1980s to a meagre 20,000 in the 2010s. Excess clothing stockpiles in the Global North are sent to regions such as Africa, actively discouraging local industry and economic development (Business Daily, 2010).

Retailers seeking price advantage outsourced their manufacturing to the Global South with significantly low labour costs. The competition within the fashion industry, coupled with concentrated ownership, weak institutional environments, and lack of accountability in developing economies, have allowed manufacturers and sub-contractors to blatantly flout labour laws (Radhakrishnan, 2015; Rahim, 2013). Poor treatment of plentiful labour, employment of

underage workers, excessive working hours, unsafe working conditions, and unreasonably low wages have persisted as the norm (Radhakrishnan, 2015). Garment workers in Bangladesh, mostly women, reported earn $96 per month – less than 3 times the amount the government prescribes for a "decent life with basic facilities" (Reichart & Drew, 2019). The US Department of Labour has also disclosed forced and child labour in fashion manufacturing in many countries including Argentina, Bangladesh, China, Indonesia, Pakistan, and Vietnam (Bureau of International Labor Affairs, n.d.). Unfortunately, economic vulnerability and lack of education amongst workers, in many of these countries, have prevented them from collective action for their welfare (Occupational Safety and Health Administration, n.d.).

Despite high-profile industrial accidents and subsequent reform over the years, 65 incidents have been reported from January 2021 to November 2022 alone, killing 141 and injuring over 800 in garment factories in Pakistan, India, Egypt, and Cambodia (Clean Clothes Campaign, n.d.). Brands such as Nike, Levi Strauss, Walmart, Hudson's Bay, H&M, and Zara have been under fire for the lack of transparency of labour protection, worker health and safety, trade unionisation policy, wage parity, environmental contamination, and corruption across their supply chain (Caniato et al., 2012; Clean Clothes Campaign, n.d.).

Shift in industry focus towards sustainability

Sustainable development, introduced as a concept to address economic and social growth with a simultaneous emphasis on environmental protection, aims to fulfill the needs of the current generation, without threatening the security of future generations – a form of 'inter-generational equity' (Morgan, 2015; UN Secretary General, 1987). Relatedly, sustainability has been defined as the "balanced integration of economic performance, social inclusiveness, and environmental resilience, to the benefit of current and future generations" (Geissdoerfer et al., 2017). The fashion sector, among many others, has since witnessed an industry-wide adoption of sustainability values. This conscious reorientation has been made possible by (i) an increase in market pressure, through consumer awareness and purchase behaviour; and (ii) heightened institutional pressure resulting from competitor influence and governance frameworks.

Market pressure

Consumer appetite for retail, including apparel, has been waning in the face of climate change, resource shortages, demographic and socio-economic changes (Pookulangara & Shephard, 2013). Growing "ethical consumerism" is mandating a standard of design, manufacture, and consumption that ensure the well-being of the environment and uplift of communities that contributed to production (Pookulangara & Shephard, 2013).

Recently, Shein, a popular Chinese fast fashion company, has accelerated the business model by constantly pushing trendy pieces of clothing at ultra-cheap prices into the online marketplace (Linebaugh & Knutson, 2022). Simultaneously, however, Shein experienced severe backlash from concerned consumers and sustainability and human rights advocates, criticizing the company for inferior quality apparel, excessive plastic packaging, and deplorable working conditions (Linebaugh & Knutson, 2022).

However, the tension between dominant fast fashion and the nascent sustainability mindset is apparent in the dissonance between purchase intention and purchase behaviour. Studies have concluded that consumers are willing to pay a premium for 'green', 'ethical', or 'sustainable' products, however, this willingness seldom translates to actual purchasing behaviour (Pookulangara & Shephard, 2013). While the target Generation Z demographic continues to criticize fast fashion brands, citing responsible consumption as the main driver of their purchasing behaviour, they also continue to fuel Shein's growth, whose investment valuation in 2022 stood at $100 billion (Linebaugh & Knutson, 2022).

Institutional pressure

The shift in industry directives towards sustainability is not solely driven by consumer knowledge and market trends; external influences and frameworks at the national and international level, have also created pressure for goal reorientation. A number of multistakeholder initiatives (MSIs) are now in place to propel development of code of conduct, digital revolution, and supplier disclosure and traceability practices across industries, including textile and apparel (Gazzola et al., 2020; Todeschini et al., 2017).

The United Nations Alliance for Sustainable Fashion is a program that promotes coordinated action within the fashion value chain for active contribution to the Sustainable Development Goals (SDGs) (Meier, 2021). The scope of this Alliance spans raw material procurement and production, manufacture, distribution, consumption, and disposal of clothing, accessories, and footwear (Meier, 2021). Through this initiative, the United Nations seeks to

align the fashion industry with SDGs such as reduced inequalities (SDG #10), responsible consumption and production (SDG #12), and climate action (SDG #13) (Meier, 2021; United Nations Alliance for Sustainable Fashion, n.d., p. 1).

The Sustainable Apparel Coalition is another initiative comprising over 200 global fashion brands, manufacturers, retailers, recyclers trade associations, governments, non-governmental organisations and academic institutions (Sustainable Apparel Coalition, n.d.-a). The focus of this partnership is on the development of a standardised means of environmental and social assessment for apparel companies— the Higg Index. Not only does this index provide a benchmark of desired sustainability performance and transparency objectives, it also provides insight into process improvements (Sustainable Apparel Coalition, n.d.-b)

Industrial transformation, grounded in sustainability, will require long-term commitment at the individual, organisational, and institutional levels, also reinforced by the influence of transnational MSIs. This industry reform envisions inclusion of sustainable values across the supply chain— the agricultural source, design and manufacture processes, trade and distribution, and aggregate consumption stages (Fletcher, 2010; Muthu, 2015).

Sustainable fashion and the circular economy

The fashion industry, following the linear economic model of take (procurement of raw materials), make (apparel manufacturing), and waste (garment consumption and disposal), has resulted in a 'social and environmental sustainability crisis' (Bick et al., 2018; Ellen MacArthur Foundation, 2017). As a way of overcoming the sustainability issues inherent in a linear economic model, including resource scarcity, resource depletion, and waste generation, the circular economy has been gaining popularity (Geissdoerfer et al., 2017).

The circular economy (CE) is a sustainability framework, based on a restorative approach, that focuses on maximising utilisation of resources and waste residuals across the supply chain (Abu-Ghunmi et al., 2016). This is achieved through redirection of the linear flow of material and energy into circular systems (Andersen, 2007). In other words, the CE replaces the end-of-life phenomenon with reduction, reuse, and recovery of materials in the production and consumption processes, resulting in more sustainable business models that eliminate the environmental loss associated with economic growth (Ghisellini et al., 2016; Witjes & Lozano, 2016). More specifically, Geissdoerfer and colleagues (2017) have defined the CE as a

"regenerative system in which resource input and waste, emission, and energy leakage are minimized by slowing, closing and narrowing material and energy loops. This can be achieved through long lasting design, maintenance, repair, reuse, remanufacturing, refurbishing and recycling" (Geissdoerfer et al., 2017).

Initial research on the transition of the fashion industry to a circular model focused on practices being implemented to reduce the environmental externalities associated with fast fashion. These frequently included clothing take-back schemes (Corvellec & Stål, 2019; Hvass & Pedersen, 2019), swapping (Armstrong et al., 2015), repair services (Armstrong et al., 2015), second-hand retail (Machado et al., 2019), and recycling (Sandvik & Stubbs, 2019). However, the adoption of predominantly end-of-life oriented CE initiatives was increasingly criticized; lifecycle assessment research in Sweden found that end-of-life (waste) was the smallest contributor to the industry's carbon footprint (Roos et al., 2016; Rosa et al., 2019). While these practices were touted as 'encouraging', there was acknowledgement that innovation in material recycling processes alone is insufficient. In a true circular economy, emphasis must also be placed on the industry's more environmentally detrimental stages— take and make (Brydges, 2021). This means that clothes must be made from recycled and sustainable material inputs, and be built to be used more, repaired, and remanufactured (Ellen MacArthur Foundation, 2017).

Successive studies on the evolving fashion industry have since reported sustainability-oriented practices that are being implemented across the clothing lifecyle— take, make, and waste, towards a CE model. These include the use of natural, biodegradable, and low-impact raw materials (Pal & Gander, 2018), transition to seasonless and durable designs (Todeschini et al., 2017), minimisation of resource wastage at the manufacturing stage (Macchion et al., 2018), post-purchase clothing care and maintenance (Laitala et al., 2012; Radhakrishnan, 2015), second-hand markets (Shen, 2014), take-back schemes (Hvass, 2015), and recycling programs (Brydges, 2021). While the literature has expanded in terms of discussing sustainability strategies that align with the CE mandate and considerations for each, the prevalence and impact of these strategies is still underexplored and contested (Brydges, 2021).

Analytical framework — Québec Circulaire's Circular Economy Framework

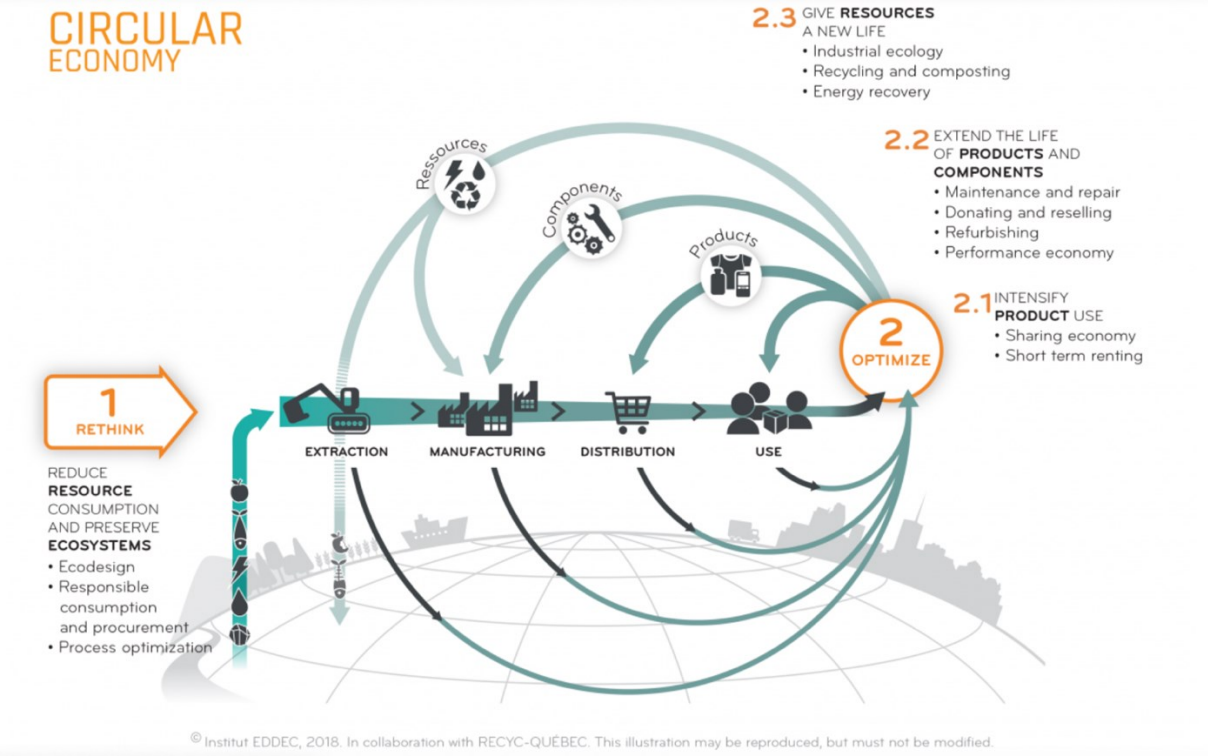
Québec Circulaire, in collaboration with Institut EDDEC and RECYC-QUÉBEC, has developed a structured CE framework that proposes twelve strategies to balance societal needs

and resource consumption (Québec Circulaire, n.d.-b, p. 1). This CE framework is used as the analytical framework directing the research in this thesis. In terms of 'rethinking' resource consumption, strategies have been identified to reduce the number of *virgin* resources extracted, including ecodesign, responsible consumption and procurement, and operations improvement. (Québec Circulaire, n.d.-b, p. 1). To 'optimise' the use of *already extracted* resources, strategies have been developed to increase the use of products, extend the useful life of products, and give a new life to resources (Québec Circulaire, n.d.-b, p. 1). These strategies include collaborative economy, short-term renting, maintenance and repair, donation and resale, refurbishing, performance economy, industrial ecology, recycling, and energy recovery (Québec Circulaire, n.d.-b, p. 1; see Figure 1). The following sub-sections describe the strategies identified by the CE framework, and discuss them in the context of the literature on sustainable fashion.

Figure 1

The Circular Economy Framework[1]

Source: Institut EDDEC, 2018



1. Ecodesign

Sustainable design is an overarching philosophy of designing the product, operating environment, and services while preserving social, environmental, and economic objectives (McLennan, 2004). This is achieved by incorporating vision of ecologically beneficial and ethical social outcomes, throughout and beyond the useful life of the garment (Niinimäki & Hassi, 2011; Pookulangara & Shephard, 2013). Research has found that eco-design, green design, or design for environment is considered one of the main strategies towards a CE (Ghisellini et al., 2016). Québec Circulaire describes eco-design as a sustainable development strategy that seeks to reduce the environmental impact associated with product manufacture. This is operationalised through efforts such as designing for reduction in resource consumption, product durability, multifunctionality, and ease of repair (Québec Circulaire, n.d.-b, p. 1).

[1] For the purpose of conceptual clarity and consistency in language, the process optimisation strategy, under the rethinking orientation of the CE framework, has been replaced with operations improvement throughout this thesis, to distinguish this from the optimising orientation.

In the context of sustainable fashion, ecodesign strategies focus on clothing architecture and functionality, in an effort to extend "product lifetime", consequently reducing overall waste and consumption (Gwilt, 2015, p. 444). To combat throwaway fashion and attain product longevity, researchers have recommended high quality manufacturing standards and repair possibilities for clothing durability and performance (Bocken et al., 2016; Kozlowski et al., 2015), timeless or trans-seasonal fashion to eliminate trend-led consumption (Todeschini et al., 2017), 'modular' or 'multifunctional' clothing to cater to customers' evolving needs (Dissanayake & Weerasinghe, 2022; Gwilt, 2015), and material selection and product architecture to facilitate clothing disassembly, recyclability, and remanufacture (Dissanayake & Weerasinghe, 2022; Sandvik & Stubbs, 2019). The latter has been proposed as an important design consideration due to the lack of technology to separate blended fibres for recycling, thereby encouraging the use of mono-materials, for example (Franco, 2017; Pal & Gander, 2018). Dangelico and Pujari (2010) conclude that while eco-design for clothing is centred on sustainable outcomes, it must also prioritise performance and aesthetics to successfully compete with 'non-green' garments.

2. Responsible procurement and consumption

Québec Circulaire identifies responsible procurement and consumption as a CE strategy that focuses on streamlining the raw material selection and product consumption to lower overall environmental impact (Québec Circulaire, n.d.-b, p. 1). This strategy includes sustainable sourcing of raw materials (Dissanayake & Weerasinghe, 2022), ensuring ethical labour practices across the supply chain (Shen et al., 2012), and generating awareness to promote mindful consumerism (Fletcher, 2010).

Within sustainable fashion literature, organisational-level procurement practices have been proposed to minimise environmental damage. These include ethical sourcing of raw materials such as cruelty-free, vegan, or fair-trade alternatives (Pookulangara & Shephard, 2013), use of natural or biodegradable inputs such as organic cotton, hemp, and linen (Shen, 2014), and the use of low-impact resources that eliminates the exorbitant use of water and chemicals in the farming process (Allwood et al., 2006). For example, Tencel has been identified as a sustainable fibre certified by the Forest Stewardship Council, ensuring a closed loop system with minimal effluents (Radhakrishnan, 2015). Overall, on the environmental front, potential suppliers are to

be evaluated on their pollution emissions, resource consumption, and environmental policies and management systems (Baskaran et al., 2012; Lo et al., 2012)

However, sustainable procurement practices are not limited to efforts for minimising environmental detriment. It also demands selection of material suppliers who engender practices for labour welfare, including aspects of human rights, child labour, discrimination, health and safety standards, and fair living compensation (Baskaran et al., 2012). This means that focal apparel brands must undertake rigorous prequalification assessments of suppliers for a holistic view on their ecological and social impact (Caniato et al., 2012; Krause et al., 2009).

At the individual level of consumption, (Gwilt & Rissanen, 2011) has emphasised forging of product attachment for customers through premium service and customisation of garments. For example, customisation services actively engage the end user in the design process, and have shown to enhance attachment to the product (Dissanayake, 2020; Piller & Müller, 2004). Essentially, the 'emotional durability', i.e., lasting partnerships between users and products, that is established can enhance product utilisation and life, lower disposal and waste, and promote mindful consumption (Chapman, 2015).

Pookulangara and Shephard (2013) have also highlighted the need for customer education as imperative to cement the philosophy of sustainable fashion. Information specific to the organisation's supply chain traceability, social responsibility, and sustainability contributions must be disseminated to the customers (Fletcher, 2010; Gazzola et al., 2020). Research posits that this ethical and environmental transparency will allow customers to make responsible purchase decisions and consider long-term investment, even if it is associated with classic clothing pieces with a higher price tag (Joergens, 2006; Moisander et al., 2010). (Chouinard, 2006) reports the effective use of 'anti-consumerist marketing' to create awareness about ecological footprint and discourage unnecessary purchases, as seen in Patagonia's *"Don't buy this jacket"* campaign (Bocken et al., 2016). Johansson (2010) stresses that the development of consumer appreciation and connection with purchased clothing items will increase closet retention and eliminate throwaway fashion. Additionally, from a CE perspective, establishing supply chain transparency and raw material traceability will facilitate end-of-life recycling for the garment (Franco, 2017).

3. Operations improvement

Operational activities across the value chain, from resource extraction to product consumption, utilise natural resources including water, energy, and agricultural inputs (citation). By including operations improvement as a CE strategy, Québec Circulaire is encouraging reduction in the consumption of resources (Québec Circulaire, n.d.-b). The CE framework proposes the use of innovative technologies to manage resources, target losses, and organise distribution logistics (Québec Circulaire, n.d.-b). Other practices to improve operations include reduction in manufacturing batch sizes (Niinimäki & Hassi, 2011), localisation of sourcing and production (Nagurney & Yu, 2012), and minimising textile waste by reclaiming materials to reintroduce into the production process (Dissanayake & Sinha, 2015).

Within the fashion industry, studies have demonstrated the frivolity of water and raw material consumption, with one pair of jeans requiring close to 4000 litres of water for manufacture (Deloitte, 2013). Therefore, pollution-abatement technology is central to sustainable development within the fashion industry, be it to ensure efficient energy and water consumption within the manufacturing process, or to reduce chemical effluents, including toxic dyes and bleaches, and fossil fuel emissions impacting the ecosystem (Deloitte, 2013; Macchion et al., 2018; Shen, 2014). However, it is also noted that highly globalised fashion supply chains are complex and often include production facilities located in emerging economies, where financial access to clean, sophisticated technology is limited (Pal & Gander, 2018). Nagurney and Yu (2012) have also suggested the use of locally sourced resources, manufacturing facilities, and logistics networks to optimise transport efficiency and minimise carbon footprint. Finally, targeting the end of the supply chain, Shen (2014) propose the implementation of responsible shipping methods, e.g., bicycles and electric vehicles.

Reclaiming used material or deadstock to reintroduce into the manufacturing process has also been proposed as an effective waste-reduction practice (Pal & Gander, 2018). However, this requires significant labour investment, as it entails skills and craftsmanship to combine design and reclamation efforts, thus exhibiting potential for further job creation (Gray & Charter, 2007). Pal and Gander have also reported the effectiveness of employing a “demand-driven, in-season purchasing model” that improves accuracy of product development, based on consumer preferences, and ensures higher proportions of sales compared to unsold waste stock (2018, p. 254). Other operations improvement practices include make-to-order and make-to-measure

manufacturing models to guarantee sales, as well as small-scale, limited batch runs of clothing to minimise inventory buildup (Niinimäki, 2010; Niinimäki & Hassi, 2011).

4. Collaborative economy

As current resource consumption levels in industrial economies are increasingly being recognised as unsustainable, the collaborative economy has been proposed as a means to reduce new purchases and promote reuse of existing products (Piscicelli et al., 2015). Québec Circulaire includes this strategy in the CE framework as a way to maximise the use of product and service circulation within the market (Québec Circulaire, n.d.-b). The collaborative economy has been defined in literature as a peer-to-peer sharing of products and services without transfer of ownership (Bardhi & Eckhardt, 2012). This may include bartering, swapping, gifting, trading, lending, and leasing of underutilised resources, products, or services, ultimately made possible through community- or network-based platforms (Piscicelli et al., 2015).

Specifically, within the fashion industry, Dissanayake and Weerasinghe posit that developing high quality, durable clothing and providing access to customers via sharing platforms can alter existing fashion overconsumption patterns (2022). This CE strategy will fulfill individual needs for fashionable clothing while also preventing premature disposal through reutilisation (D. G. K. Dissanayake & Weerasinghe, 2022). For example, Dutch circular fashion brand, MUD Jeans, introduced their 'Lease a Jeans' program to popularise ownerless consumption of jeans, by allowing customers to pay a fixed monthly amount for 12 months, after which they may choose to keep the jeans, swap them for a new pair, or return them for recycling (Mud Jeans, n.d., p. 1)

5. Short term renting

Similar to the collaborative economy, the Québec Circulaire framework includes short-term renting as a strategy to intensify product use, through an "access form of consumption" (Tukker, 2015). By rendering ownership and purchase unnecessary, the renting model can derive the most utility out of products, by providing access to other users (Pedersen & Netter, 2015; Québec Circulaire, n.d.-b). This increase in product utilisation will optimise the use of extracted resources and reduce the need to extract virgin resources.

Rental in the fashion industry, including subscription models, can enable customers to have renew their wardrobes, without the negative environmental impact (Ellen MacArthur Foundation, 2017). This access-based offering means that customers receive the functionality of

the clothing for a fee, rather than ownership, thus reducing the overall volume of clothing produced and resources consumed (Bocken et al., 2016). Beyond the Runway is a Canadian company that provides rental services for designer clothing and accessories. The *basic* package allows for one-time rental of individual clothing items, while the *silver* and *gold* subscription packages including fixed monthly payments for a number of items that can be rented for up to 6 months (Beyond the Runway, n.d., p. 1). However, as much as access models "decouple the physical product life from its fashion cycles", Pal and Gander have emphasised the importance of garment durability and trendiness to successfully achieve product life extension (2018, p. 258).

6. Maintenance and repair

The CE framework includes maintenance and repair as one of the strategies to extend the useful life of products. Repair and servicing may be undertaken by the consumer, a specialised organisation, or the manufacturer, and can be used for high-value, long-term goods, such as houses and vehicles, or for consumer goods and appliances (Québec Circulaire, n.d.-b). While the intention is to extend product life and reduce further pressure on extraction and consumption of virgin resources, deterrents do exist in terms of cost of repair and product obsolescence (Québec Circulaire, n.d.-b).

Within the sustainable fashion literature, provision of garment warranty with repair services has been recommended to create long-term customer relationships and revenue streams (Geissdoerfer et al., 2020; Niinimäki & Hassi, 2011). Beyond clothing manufacturers, customers may also explore the option of independent service providers for garment tailoring, repair, and alteration in the locality (Québec Circulaire, n.d.-b). Stahel (2013) emphasise that repair and remanufacture, as CE strategies, have a localised orientation, that allows for lower transport costs, transaction costs, as well as environmental costs. This is in contrast to the recycling strategy which operates with a global perspective and "principles of industrial production, such as economies of scale" (Stahel, 2013, p. 4). Within the industry, brands have been reported to equip customers with the knowledge and tools to maintain their garments at home. For example, Nudie Jeans, a Swedish sustainable denim brand, Do-It-Yourself repair kits for consumers to undertake mending exercises with the proper tools and guidelines (Nudie Jeans, n.d., p. 1).

7. Donating and reselling

Québec Circulaire includes donation and resale of pre-owned products as a CE strategy as it allows individuals and organisations to insert goods no longer needed back into market circulation, thus extending the useful life (Québec Circulaire, n.d.-b). In addition to the cost advantage, environmental and social motivations are also increasingly being associated with the second-hand economy (Québec Circulaire, n.d.-b). Digital platforms such as Facebook Marketplace, Kijiji, and eBay offer opportunities for connecting product providers with product seekers (Québec Circulaire, n.d.-b).

In the textile and apparel industry, second-hand consumption is made possible through online resale platforms, consignment stores, and local vintage stores. Hvass (2015) has also proposed the initiatives of having donation bins in store allowing customers to donate used garments, for resale or onward donation, as seen in brands such as H&M, Zara, and Boomerang. Luxury consignment stores, including Vespucci and VSP that are based in Canada, promote affordable and sustainable shopping experience for customers seeking pre-loved clothing and accessories (VSP, n.d., p. 1). From a circularity lens, Fletcher (2008) has concluded that reusing a garment as-it-is yields substantial ecological savings; collecting, sorting, and reselling pre-loved garments use up to 20 times lesser energy than manufacturing a new clothing item.

8. Refurbishing

The CE framework defines refurbishing as the guaranteed restoration of a product (or its components) to as good a condition as a new one (Québec Circulaire, n.d.-b). The refurbishing process includes collection, transportation, disassembly, check, rework, reassembly, and reinsertion into market circulation (Québec Circulaire, n.d.-b). The CE also encourages producers to utilise a closed-loop system to reinsert parts (or entirety) of second-hand products into the manufacture of new products (Québec Circulaire, n.d.-b).

Within sustainable fashion, literature has reported end-of-life collection programs to source clothing that would otherwise be disposed, recover useful components, redesign, and reassemble into a new clothing item for sale (Dissanayake & Sinha, 2015). However, important considerations for refurbishing and remanufacture include quality and durability of fabric, blend of fibres in the fabric, ease of disassembly, and traceability of components including dyes and chemicals (Dissanayake & Weerasinghe, 2022; Franco, 2017). Patagonia's ReCrafted Line is created from used clothing items collected through their Worn Wear program, which are then sorted, designed, deconstructed, and assembled into new, unique pieces (Patagonia, n.d., p. 1).

9. Functional economy

The functional economy has been defined as a CE strategy that focuses on selling products-as-service, i.e., users pay for the functionality, not the product itself (Québec Circulaire, n.d.-b). Under this model, the ownership remains with the manufacturer, who has full control over product end-of-life, including efforts for repair, refurbishing, and remanufacture (Québec Circulaire, n.d.-b). Although short-term renting also allows for customers to pay for access over ownership, this strategy is distinct in that manufacturers retain ownership and prioritise end-of-life recovery and remanufacture (Québec Circulaire, n.d.-b).

Although gaining traction in other industries, providing cost advantage to customers and having an overall positive ecological impact through closing the loop, this strategy has not been discussed in sustainable fashion literature.

10. Industrial ecology

In order to give resources a new life, the CE framework identifies industrial ecology as a strategy that optimises the use of natural resources by recycling residual waste across the value chain (Québec Circulaire, n.d.-b). In other words, this has been described as a process-oriented solution that focuses on turning waste outputs from one process into "feedstock" for another process or product line (Chertow, 2000). Using a multidisciplinary approach for design and operations improvement, organisations within industrial symbiotic networks exchange resources and innovative practices to minimise residuals (Québec Circulaire, n.d.-b). Since 2013, Synergie Québec provides a network for organisations that seek to form symbiotic relationships for circularity objectives (Synergie Québec, n.d.). This organisation helps businesses analyse and manage their production cycle, optimise resource utilisation, adopt clean technology, and coordinate with other businesses to manage waste disposal (Synergie Québec, n.d.).

Research within sustainable fashion has advanced creative upcycling initiatives to incorporate deadstock and waste materials from other organisations in the industrial network (Hvass, 2015; Shen, 2014). The definition of deadstock fabric, although initially referring to damaged and defective leftovers, has now been expanded to include overstock and surplus fabrics (The Honest Consumer, 2021, p. 1). For example, sustainable brand, Reformation, incorporates the use of deadstock and vintage material in the production of their clothing lines and aims to continually increase this usage in their commitment to circularity (Reformation,

n.d.). Hvass (2015) has also pointed out that being part of the industrial ecology, not only allows brands to source and utilise residuals from other brands, but also provides them an opportunity to partner with other organisations to better manage their own leftovers. In doing so, brands are giving existing resources a second life and reducing pressure on extraction and consumption of virgin resources.

11. Recycling and composting

With the objective of resource renewal, recycling and composting have been included as CE strategies to salvage waste headed for the landfills. In the manufacturing process, recycling replaces the use of virgin raw materials with recovered resources (Québec Circulaire, n.d.-b). Recycling can take multiple forms— primary, secondary, and tertiary. Primary recycling refers to mechanical reprocessing of 'waste' into a product with equivalent or improved properties (Hopewell et al., 2009). Secondary recycling is also a form of mechanical reprocessing into products with reduced properties, also referred to as downcycling (Hopewell et al., 2009). Tertiary recycling is a chemical reprocessing method that breaks down materials into raw, structural components (Kumar et al., 2011). Composting, by definition, is the processing and biological decomposition of organic matter into a stable product that can be returned to the natural environment (Bocken et al., 2016; Québec Circulaire, n.d.-b). Composting, as a CE strategy, is especially suitable for consumables that wear during their use, as it ensures products are designed with safe, organic, and biodegradable materials (Bocken et al., 2016; McDonough & Braungart, 2002).

In the fashion industry, 73% of textile waste is sent to landfills or incinerated, 12% is 'downcycled' into lower value products such as insulation material, and only 1% is recycled into new clothing (Remy et al., 2016). It is important to note that despite the industry's focus on downcycling, it does not contribute to the circular economy, as it merely delays the linear flow of resources to the waste phase (Bocken et al., 2016; McDonough & Braungart, 2002). Instead, the use of recycled fibres has been proposed as a major contributor to circularity, including nylon, polyester, PET bottles, fishing nets, and other industrial waste for the production of new garments (Pure Waste, n.d.). These are obtained after waste materials are mechanically or chemically recycled into yarn, and eventually re-spun into fabric (Dissanayake & Weerasinghe, 2022). Additional efforts, as part of the product offering, include designing packaging to be made from recycled or compostable materials (Gwilt, 2015).

12. Energy recovery

The Québec Circulaire framework also energy recovery as strategy to obtain energy from residual materials (Québec Circulaire, n.d.-b). Although also known as thermal recycling, this is not strictly considered as recycling within the CE because only part of the energy content from the material is reused, largely characteristic of a linear system (Hopewell et al., 2009). The framework lists thermal processes for energy recovery, such as incineration, combustion, pyrolysis, and gasification (Québec Circulaire, n.d.-b, p. 1). However, these processes are only considered energy recovery if they yield a net positive energy balance, without contributing to greenhouse gas emissions (Québec Circulaire, n.d.-b).

Although more applicable in other industries, with an overall positive ecological impact by salvaging energy, this strategy has not been discussed within sustainable fashion literature.

Table 1 summarises the CE framework strategies and practices observed within the sustainable fashion literature.

Table 1

The Circular Economy Framework: Objectives, strategies, and sustainability practices

Objectives	Strategies	Sustainability practices identified in the literature	Key references to strategy from literature
Reduce resource consumption and preserve ecosystems	Ecodesign	Design for longevity through quality and ease of repair	Bly et al. (2015); Bocken et al. (2015); Kozlowski et al. (2015)
		Design for longevity through timelessness, simplicity, multi-functionality	Gwilt (2015); Todeschini et al. (2017)
		Design for disassembly and recyclability (e.g., use of mono-fibres)	Dissanayake &Weerasinghe (2022); Sandvik & Stubbs (2019)
	Responsible procurement	Implementation of ethical labour practices including supply chain partnerships with shared values and ethics	Fletcher (2010); Kozlowski et al. (2015); Shen et al. (2012)
		Use of natural, ecological fibres, or biodegradable fabrics e.g. organic cotton, linen, hemp, algae and cellulose fibres	Kozlowski et al. (2015); Shen (2014)
		Responsible sourcing of raw materials including low-impact organic farming without pesticides and exorbitant water utilisation	Allwood et al. (2006); Pal & Gander (2018)
		Ethical sourcing of raw materials including vegan, cruelty-free, fair trade materials such as down alternatives	Pookulangara & Shephard (2013); Shen et al. (2012)
	Responsible consumption	Establishing product attachment for consumers through premium service, curation, and customisation of garments	(Niinimäki, 2010); Niinimäki (2010);
		Provide transparent information to customers in terms of pricing, supply chain traceability, sustainability, and social responsibility initiatives	Fletcher (2010); Gazzola et al. (2020)
		Promote responsible consumption through anti-consumerist marketing (e.g., limited to no sales incentives, thrifting etc.)	Chouinard (2006); Bocken et al. (2016)
		Create awareness for post-purchase care (e.g., reduction in frequency and temperature of laundry, mending etc.)	Laitala et al. (2011); Radhakrishnan (2015)

Objectives	Strategies	Sustainability practices observed in the fashion industry	Key references to strategy from literature
Reduce resource consumption and preserve ecosystems *(continued)*	Operations improvement	Limited batch size / small-scale production	Niinimäki (2009)
		Demand-driven product development (e.g., Made-to-measure or made-to-order manufacturing models)	Niinimäki and Hassi (2011); Papahristou and Bilalis (2017)
		Use of clean technology for low carbon emissions (e.g., use of renewable resources over fossil fuel)	Pal and Gander (2018)
		Use of technology for reduced water and energy consumption in the manufacturing process	Deloitte (2013); Macchion et al. (2018);
		Use of clean technology for reduced chemical effluents (e.g., toxic dyes and bleaches)	Radhakrishnan (2015); Macchion et al. (2018)
		Reclaim part of or entire material to reintroduce into the manufacturing process	Dissanayake and Sinha (2015); Pure waste (2016)
		Ensure transport efficiency and low carbon footprint (e.g., regional procurement and local production, mode of transportation)	deBrito et al. (2008); Nagurney and Yu (2012)
		Implement responsible shipping methods via bicycle and electric vehicles locally	Nagurney and Yu (2012); Shen (2014)
Intensify product use	Collaborative economy	Peer-to-peer sharing of clothing items on community- or network-based platforms	Dissanayake and Weerasinghe (2022)
	Short-term renting	Provision of clothing rental services, including subscription models	Ellen MacArthur Foundation (2017)
Extend the life of product and components	Maintenance and repair	Provide (lifetime) warranty with (free) repairs and touchups of garments, storage and cleaning services	Niinimäki and Hassi (2011); Gwilt (2015)
	Refurbishing	End-of-life collection program (e.g., takeback schemes, recycling, and/or second-hand retailing)	Kozlowski et al. (2014); Shen (2014); Hvass (2015)
	Donating and reselling	Donation of end-of-life collected items	Hvass (2014)
		Reselling platforms e.g., consignment stores	Hu et al., (2014); Pederson and Netter (2015); Armstrong et al. (2015 t)
	Functional economy	***Note: Strategy not discussed in sustainable fashion literature***	

Objectives	Strategies	Sustainability practices observed in the fashion industry	Key references to strategy from literature
Give resources a new life	Industrial ecology	Repurposing and upcycling deadstock and waste materials	Shen (2014); Hvass (2015); Todeschini et al. (2017)
		Partnerships with brands and organisations for resale or donation of leftover materials	Hvass (2015)
	Recycling and composting	Use of recycled fibres (e.g., material from discarded industrial or ocean waste, PET bottles etc.)	Shen et al. (2012); Hvass (2014); Bly et al. (2015)
		Use of minimal, recycled, reusable, and compostable packaging	Gwilt (2015)
	Energy recovery	***Note: Strategy not discussed in sustainable fashion literature***	

Challenges

Despite the merits, challenges for widespread operationalisation of sustainable objectives and transition to the circular economy persist. The sustainable fashion literature discusses various barriers, including supply chain complexity, continued presence of fast fashion brands, access to sustainable and recycled raw materials, access to technological and financial resources.

Supply chain complexity

The complexity of an apparel brand's supply chain poses quite a challenge in terms of alignment of values and goals for operational disruption favouring sustainability and circularity (Fletcher, 2008). Reverse logistics process, necessary for various circular strategies, including collection, inspection, and reuse, bring forth further complications (Kozlowski et al., 2015). This complexity introduced challenges in terms of "monitoring, reporting, and improving sustainability practices throughout the chain" (Kozlowski et al., 2015, p. 378). Todeschini et al. (2017) have, therefore, emphasised the need for knowledge sharing networks amongst stakeholders, resources, and capabilities for the widespread operationalisation of circular values within the fashion industry. Sharing knowledge about consumer behaviour, implementation strategy, and supply chain operations can result in optimised costs and improved performance of sustainable apparel in the market (Beh et al., 2016).

Competition with fast fashion

While sustainable fashion grows in popularity, the continued existence of fast fashion retailers forces constant change in fashion trends, negating all efforts of producing a timeless silhouette for longevity of consumption (Gam & Banning, 2011). Sustainable clothing design, with consideration of ethical procurement and recyclability for example, inherently dampens responsiveness to ever-changing trends (Mont, 2008). Furthermore, large fast fashion brands generate economies of scale that fuel price competition and promotional wars against relatively smaller sustainable brands (Pal and Gander, 2018). Todeschini et al. (2017) have, therefore, asserted that companies must educate consumers on the negative environmental and societal externalities of conventional fashion business models, and convince customers of their influence as change catalysts. Additionally, customers must be guided on the extension of lifespan of a

clothing item, through proper care and maintenance, and creative end-of-life upcycling or recycling propositions (Wang and Song, 2010).

Access to sustainable raw materials

One of the most important barriers to CE transition is access to sustainable raw materials. Steady procurement of organic, sustainable, or recycled fibers for clothing manufacture is complex, and as a niche market, recycled materials prove to be more expensive compared to virgin alternatives (Pookulangara and Shephard, 2013). Additionally, Dissanayake and Sinha (2015) have raised concern that the idyllic concept of using post-consumer waste is extremely restrictive in the type, colour, fabric, size of material available. Considering the lack of standardisation and unpredictable availability, Todeschini and colleagues (2017) have reinforced the need for reliable supplier networks, to rethink clothing design with recycled and greener materials. These limitations of material repeatability and standardisation have resulted in the scale and scope of clothing reintegration and remanufacture to remain niche (Dissanayake and Sinha, 2015). Overall, material innovation has been recognised as a critical factor to reduce consumption of virgin resources, make the use of recycled resources economically attractive, and facilitate the transition to a circular economy (Ellen MacArthur Foundation, 2021).

Access to technology and finance

A practical hindrance to the transition to a fully circular model is the cost involved. Recycling has had limited implementation as it is more expensive for organisations compared to procurement of virgin materials (Kirchherr et al., 2018). Additionally, the lack of technology for complex material sorting, and mechanical and chemical recycling elicits questions about economic feasibility and potential for operational scaling (Pedersen et al., 2019). Dissanayake and Weerasinghe (2022) have, therefore, stressed on the development of resource-efficient and cost-effective technologies for material circulation and reduction in ecological footprint.

The extensive review of literature has bridged understanding about the implementation of sustainability practices in the fashion industry globally, and their alignment with CE objectives and strategies, as outlined in the CE framework. However, the CE framework has specifically been developed by the Québec Circulaire to promote the transition of industries in the province to a circular economic model. Therefore, this study will explore the sustainable fashion industry

in Montreal, in light of this analytical framework, and analyse the circularity strategies being adopted across the supply chain, since most sustainable fashion literature focuses solely on the later stages of clothing lifecycle (Brydges, 2021; Rosa et al., 2019). Following Brydges'(2021) assertion that CE principles manifest differently in various contexts, this research with also add to existing literature by identifying industry- and geography-specific factors that influence the fashion industry's transition to the CE in Montreal.

Methodology

Research design

The objective of this thesis[2] is to explore and analyse the sustainable apparel industry in Montreal, and its contribution to the circular economy. The Circular Economy (CE) framework published by Québec Circulaire, and developed by Institut EDDEC and Recyc-Québec, has identified circularity orientations, objectives, and strategies (Québec Circulaire, n.d.-b). Through a case study design focusing on Montreal as an ecosystem of sustainable apparel brands, qualitative research was undertaken to empirically study the prevalence and variety of circularity strategies and practices employed by sustainable fashion brands in their natural functioning environment (Eisenhardt, 1989).

Additionally, this study provided a comprehensive look into the circularity mandates of individual organisations within Montreal's women's apparel industry. Interviews with key informants provided focused understanding of single settings, including explanatory insights into the brand's choice of sustainability practices, organisational and operational considerations, social and ecological impact, and barriers to the transition to a circular economic model in Montreal. While the CE framework was used to direct this research, strict adherence to theory was minimised to allow genuine exploration within systematic data collection parameters (Eisenhardt, 1989).

Research context — The case of Montreal

Montreal, hailed as Canada's 'fashion capital', is the third leading city in North America for clothing manufacturing, after Los Angeles and New York (Martini & Lifson, 2013). According to *Écomusée du fier monde*, Canada's first handmade garment manufacturing center was established in Montreal, as early as the 1820s (Écomusée du fier monde, n.d.). With the support of the Canadian government to propel industrialisation and international trade, and following the setting up of the notable *Singer* sewing machine factory in Montreal, the first cotton and silk mills and textile manufacturing factories were established along the Lachine Canal in 1884 (Archibald, 2021; Écomusée du fier monde, n.d.). During the latter half of the 20th

[2] This study received approval from the Human Research Ethics Committee at Concordia University, and all necessary protocols were followed.

Century, the Montreal Garment District was relocated to the Chabanel sector, which continues to serve as a major textile production hub in Canada (Archibald, 2021).

In the 1960s, Montreal pioneered the combination of European design sensibilities and Parisian fashion with the emerging global trend of high-end, ready-to-wear clothing (Yagoubi & Tremblay, 2016). This bridge between industrial garment manufacturing and creative design contributed significantly to Quebec's status in the North American fashion landscape (Yagoubi & Tremblay, 2016). However, during the 1990s and beyond, Quebec lost much of its competitive production standing as Canada witnessed a steady decline in export revenue due to global trade liberalisation efforts (Wyman, 2006). Despite this, over the years, Quebec has maintained its leading position within the country's fashion market, as manufacturers clocked in close to $8 billion in annual revenue in 2013 (Martini & Lifson, 2013; Wyman, 2006). In *Rapport du groupe de travail: Mode & Vêtement* presented to the Government of Quebec, statistics show that 48% of Canada's fashion industry-related jobs, amounting to approximately 28,000, are situated in Quebec (Martini & Lifson, 2013). Out of these, 70% are found in Montreal, making it the primary city for apparel manufacture and retail in the country, followed by Toronto and Vancouver (Martini & Lifson, 2013).

Today, organisations such as *Mmode, the Metropolitan Fashion Cluster*, bring together various industry actors for concerted efforts towards collective goals of manufacturing development, industry growth, and international competitiveness (Mmode: The Metroplitan Fashion Cluster, n.d.). On the consumer end, exhibitions by cultural institutions such as *the Musée McCord, the Musée du Costume et du Textile du Québec, and the Musée des Beaux-Arts de Montréal* not only reflect Montreal's cultural history and vibrant identity, but also nurture local interest in fashion and facilitate creation of domestic and international fashion networks, which few other Canadian cities possess (Sark & Bélanger-Michaud, 2015).

Montreal, with its expertise, industrial networks, and progressive design community, has followed the global reorientation of the fashion industry towards sustainability. At present, the city has a vast (and growing) list of sustainable fashion brands that manufacture and retail men's, women's, and unisex apparel and accessories. The city's prestige as Canada's fashion hub and its growth as a conducive backdrop to notable sustainable brands, such as Frank And Oak and Kanuk, provide compelling reasons for exploratory research in the sector, including factors germane to the local landscape that support circularity objectives.

Extant literature has demonstrated women reporting higher levels of satisfaction from shopping, compared with men, resulting in higher engagement in hedonic shopping behaviours (Herter et al., 2014; Meyers-Levy & Sternthal, 1991; Mittal & Kamakura, 2001). In 2022 alone, the revenue generated from women's apparel in the United States stood at $133 billion, more than men's and children's clothing combined (Tighe, 2022). Coincidentally, while women continue to be proportionately larger consumers of apparel globally, they have also exhibited higher propensity towards sustainability, in terms of ethical wage, animal welfare, and environmental protection, compared to their male counterparts (Gazzola et al., 2020). It is, for these reasons, that the research agenda for this thesis is narrowed to focus on sustainable brands for women's apparel, founded or based in the Greater Montreal Area[3].

Research sample

To map the sustainable fashion landscape of Montreal, purposive sampling was used to ascertain the research sample. Briefly, purposive sampling is a biased sampling technique used to non-randomly identify and recruit brands and participants with significant likelihood of producing useful insights, thereby utilising limited research resources most effectively (Miles & Huberman, 1994; Palinkas et al., 2015). The selection of brands to be included was guided by three inclusion criteria. First, all included brands must be based in the Greater Montreal Area. Second, they must be involved in the design, manufacture, and retail of women's apparel. Third, through their mission, vision, and/or values, they must have expressly stated an organisational commitment to sustainability. A systematic review of archival sources, including websites, reports, news articles, blogs, social media content, and organisational directories resulted in the identification of 90 brands that fulfilled the aforementioned criteria. See Appendix A for a complete list of sustainable fashion brands included in this research sample.

From the sampled organisations, 52% of sustainable brands (47 out of 90) were founded within the last ten years, another 31% from 2003 to 2012, and only 15 sustainable brands in the years 1946 to 2002. These brands also vary significantly in size; 64% are considered 'micro-brands'—companies with less than 10 employees, including single owner-operators— and only

[3] Greater Montreal Area as defined by Statistics Canada: https://www12.statcan.gc.ca/census-recensement/2021/dp-pd/prof/details/moreinfo-plusinfo.cfm?Lang=E&cdguid=2021S0503462&SearchText=Montr%C3%A9al&DGUIDlist=2021S0503462&GENDERlist=1&STATISTIClist=1&HEADERlist=0

2% are large enterprises that employ upwards of 500 employees (Statistics Canada, 2022). Only one company, Gildan, is a publicly held organisation listed on the New York and Toronto Stock Exchanges. Out of the 90 brands studied, 71% are women-owned, and another 8% include women in joint leadership positions. It is important to note that while sustainability is at the forefront of all of these brands' mission, only 3 companies have publicly available sustainability reports, including Brand Impact and ESG Reports, and Supplier Code of Conduct. In addition, 4% of the brands in this study are Certified B Corporations[4].

Preliminary data were augmented with semi-structured interviews conducted with key informants from the brands in the research sample. At the participant level, purposive sampling was employed for the recruitment of individuals possessing knowledge and/or experience with a 'phenomenon of interest' (Creswell & Plano Clark, 2011). Participant selection for the semi-structured interviews was guided by three inclusion criteria. First, interview participants must be employed by one of the 90 brands included in the research sample. Second, they must have organisational or subject expertise to speak to the sustainability mandate of the brand, e.g., founders and entrepreneurs, designers, and sustainability leaders. Third, they must have been working for the organisation for at least one year. A total of 12 interviews were conducted with participants who fulfilled the research criteria, with a final participation rate of 11%. See Appendix B for a complete list of interviewees from sustainable fashion brands in the research sample.

Data collection

First, operational and sustainability data were collected for all 90 brands included in the research sample, through publicly accessible sources of information, such as company website and social media content, reports, news articles, press releases, and blogposts. More specifically, data were collected on the mission, vision, and values of identified brands, as well as the specific sustainability practices that they employ. Other descriptive information, including organisation

[4] B Corp, a certification by B Lab Global, measures an organisation's social and environmental impact. Certified B Corporations must demonstrate their commitment to an "inclusive, equitable, and regenerative economy" through high social and environmental performance, corporate governance and accountability, and transparency. https://www.bcorporation.net/en-us/certification/

size, age, and leadership, was also collated. See Appendix C for consolidated data analysed for all 90 brands in this study.

Archival data were then supplemented with semi-structured interviews with key individuals from sustainable fashion brands in the research sample. Based on access and availability, one-on-one interviews were scheduled with entrepreneurs, designers, and sustainability leaders. Participants were identified through the researcher's personal network and referrals, brand websites, news articles and blogposts, social media platforms such as LinkedIn and Instagram, as well as through the networks of organisations such as MMode. For all 90 brands, recruitment letters for interviews were sent out to 114 individuals, starting January 16, 2023, following Ethics Committee approval. Information and consent forms (see Appendix D) were sent out to the participants and organisational approval (see Appendix E) received for each interview.

The first part of the semi-structured interview addressed the brand origin and business context, with questions about inspiration and brand ideation, including focus on sustainability as a core value. Subsequent questions touched upon aspects of Montreal's cultural, industrial, and regulatory environment as a potentially conducive backdrop for the rise and success of sustainable apparel brands. The second part of the interview explored the existing business operations, including sustainability strategies, customer response, and organisational challenges. The influence of internal characteristics (e.g., organisational size, values, and leadership vision) and external factors (e.g., supply chain networks and government policy) on the implementation of sustainability practices was also explored. Discussion also comprised key aspects of the brand's social and/or environmental impact within the industry. The last section of the interview covered potential business model evolution, in terms of organisational growth trajectories, and associated challenges. See Appendix F for interview guide.

Interviews were conducted in person and through video/phone call, depending on feasibility and participant preference. Additionally, participants were also provided language options, i.e., English or French, for the interview. A total of 12 interviews were conducted, each lasting approximately one hour. Interviews were audio-recorded, with consent, and transcribed through a third-party software: Otter.ai. Auto-generated transcripts were reviewed for accuracy and clarity, before being coded for dominant themes. For participants that opted for the French

language, interviews were conducted, transcribed, and translated by a Research Assistant with prior approval from the Ethics Committee.

For this case study design, the use of multiple data collection methods – archival data and interviews – allow for verification and triangulation of circularity strategies and sustainability practices, as well as other constructs of research interest (Eisenhardt, 1989).

Data analysis

For each of the 90 brands identified, data related to their sustainability practices were recorded and compiled in a spreadsheet to track potential trends in the practices implemented and areas of strategic focus. Collated data were coded for sustainability practices as identified within sustainable fashion literature. Then, these practices were organised into circularity strategies and orientations identified by the CE framework. An initial round of deductive coding was conducted, whereby a code sheet of sustainability practices discussed in the sustainable fashion literature was used to identify and code the practices in the data. For example, the sustainable fashion literature identifies the use of ethical raw materials, including vegan, cruelty-free, and fair-trade, as a key practice for responsible procurement (Pookulangara & Shephard, 2013; Shen et al., 2012). Kanuk's website states their commitment to be "entirely fur-free" (Kanuk, n.d., p. 1). The outerwear brand explains that "innovations at our disposal today" can eliminate the historic tradition of using fur in outerwear (Kanuk, n.d., p. 1). This practice employed by the brand was, therefore, coded under *use of ethical raw materials*, as discussed in sustainable fashion literature.

Next, the data were coded inductively to identify additional sustainability practices, not discussed in the literature but appearing in the data. In these cases, the analytical approach was altered to record specific brand practices, interpret them, and combine them into new, broader categories (Chinn & Kramer, 1999). For example, Frank And Oak's website states their effort of designing "rivetless" denim (Frank And Oak, n.d.-a, p. 1). The brand expands on this sustainability practice stating that metal rivets in jeans "cannot be salvaged and complicate the recycling process" and therefore have been eliminated from the design (Frank And Oak, n.d.-a, p. 1). This specific practice employed by the brand, not found in literature or the framework, was included as a new category, *design for recyclability*, under the eco-design strategy.

After the specific sustainability practices were identified, they were then grouped according to the strategy categories identified in the CE framework. For example, sustainability practices associated with product design, such as design for durability and design for recyclability, were grouped into the CE framework's ecodesign category. After all practices were grouped according to their associated CE strategy, they were then grouped by orientation. For example, ecodesign is linked to a *rethinking* orientation, and so the sustainability practices in this grouping were coded accordingly.

Within qualitative research, data is often quantified and summarised via counts and tabulation to "answers questions about *what* and *how many*" (D. L. Morgan, 1993, p. 116). Likewise, this analysis not only identified specific sustainability practices being implemented by individual sustainable brands in Montreal, but through counts and frequency, also indicated strategic focus areas (e.g., eco-design) and orientations (i.e., rethinking vs. optimization) for a better understanding of the circularity approaches favoured by this industry in Montreal, Canada.

Interviews were conducted with key informants from the research sample for detailed explanatory findings regarding the operationalisation of circularity strategies. To do so, a thematic analysis was conducted on the data collected through the 12 semi-structured interviews. Thematic analysis, defined as a descriptive method for "identifying, analysing, and reporting patterns (themes) within data", provides a rich, nuanced, and meaningful account of the information obtained (Braun & Clarke, 2006, p. 79).

To organise and analyse the data, an abductive approach was taken to code the data from the transcripts. While deduction is primarily associated with theory-driven phenomena testing (Hurley et al., 2021), and induction is defined as an interpretive development of theory (Gioia et al., 2013), abduction is considered a "middle ground" (Timmermans & Tavory, 2012). The abductive approach involves "parallel and equal engagement with empirical data and extant theoretical understanding" (Thompson, 2022, p. 1411). In other words, guided by theoretical parameters, abductive research is neither strictly arbitrary nor restrictive, rather it aims to derive the most meaningful explanation for the phenomenon of interest (Coffey & Atkinson, 1996; Hurley et al., 2021). As posited by Peirce, this approach is of importance to identify and make sense of new ideas from the empirical data collected for potential explanatory findings (1974).

Reviewed transcripts were initially coded incident-by-incident at the most granular level to familiarise with and interpret the raw data, with every significant detail included as a code in

NVivo (Charmaz, 2014; Saldaña, 2015). As data were continuously being collected and understanding deepened, consequent rounds of more focused coding were conducted. This selective and directed coding approach allowed for merging and elimination of categories, aiding the synthesis and explanation of data obtained from all 12 interviews (Charmaz, 2014; Saldaña, 2015).

In line with the abductive analytical approach, the development of these categories or codes was initially based on existing literature and the CE framework. For example, literature identifies availability of basic materials (e.g., fibres, fabrics), components (e.g., zippers and hardware), and complementary products (e.g., packaging) as an important determinant for the development, production, and sale of circular products (Franco, 2017). To understand if Montreal provides a conducive environment for sustainable fashion brands, we coded for existing networks of raw materials suppliers, by categorising data within interviews under the code *access to raw materials*. While data from the interviews empirically supported the theory that good access to raw materials enables sustainable apparel production, novel findings from the data were also recorded. For example, while Montreal was found to provide some brands with good access to raw materials, other brands discussed the challenges of procuring certain types of raw materials, such as new, sustainable fabrics and hardware. Consequently, new codes were created to reflect emergent incidents, such as *limited access to sustainable raw materials*. Finally, the abductive approach was used to code potential explanations provided by interviewees for some of these emergent findings. New codes were created for the explanatory factors identified, including, the decline in the manufacturing infrastructure in Montreal, the lack of local production and supplier choice, and high import costs. See Appendix G for codebook.

After several iterations of coding, themes were identified that go beyond the descriptive level of analysis associated with categories (Graneheim & Lundman, 2004). Braun and Clarke (2006) describe themes to capture findings in the data that responds in some meaningful way to the research inquiry, beyond mere quantifiable measures. Themes were developed by sorting codes and examining possible relationships to provide explanations for the phenomenon of interest (Braun & Clarke, 2006). Extending the previous example, abductive analysis of the codes unveiled a possible theme; brands that cite favourable access to raw materials are those that benefit from waste materials and deadstock fabrics— not necessarily sustainable at source

materials— from larger brands in garment industry, while brands that refer to access as a challenge are those that are seeking out new, sustainably farmed and sourced raw materials.

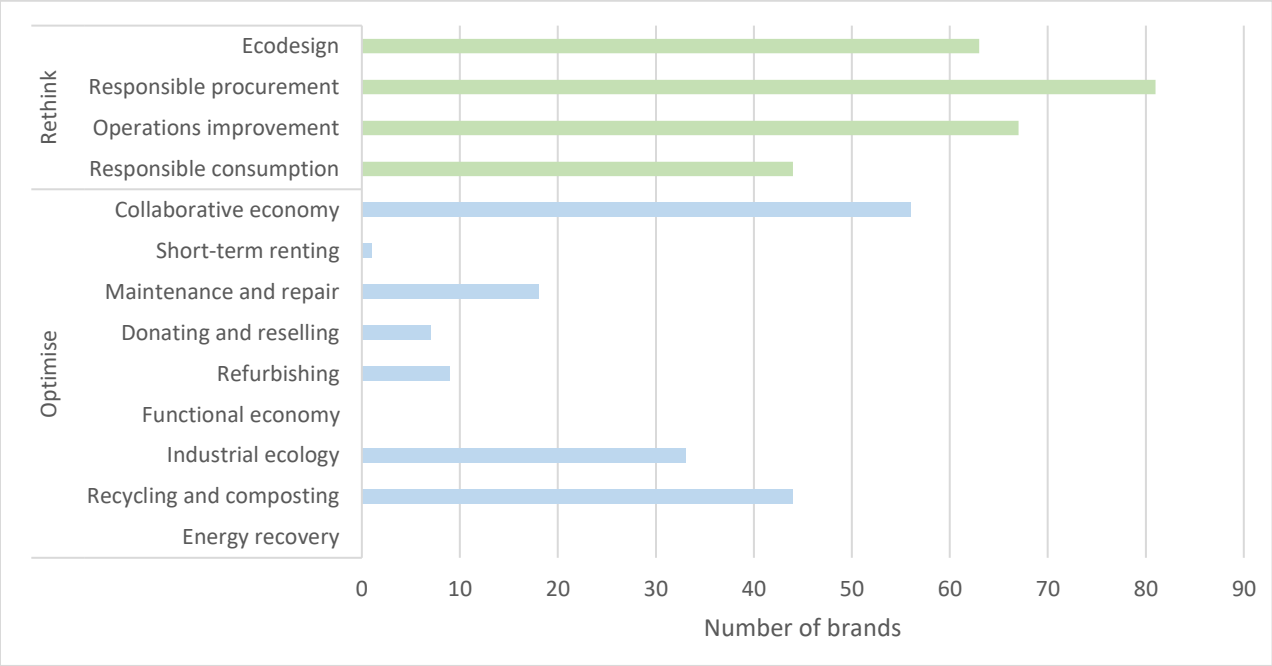
It is important to note that the data collection and analysis process has been non-linear, requiring frequent reorientations and revisions, including continued reference to literature and the analytical framework. Overall, the case study design resulted in an in-depth understanding of the sustainable fashion industry in Montreal, based on participant narratives.

Findings

This study examined the sustainable fashion industry in Montreal using Québec Circulaire's Circular Economy (CE) framework, finding that several brands in this industry have adopted circularity strategies, and various practices to operationalise them. As previously mentioned, the 12 strategies included in the CE framework are characterised by two key circularity orientations— *rethinking* the use of virgin resources and *optimizing* the use of extracted resources (Québec Circulaire, n.d.-b). This study finds that most brands in Montreal's sustainable fashion industry are adopting strategies that reflect a *rethinking* orientation. Of the 90 brands studied, 89 employ a combination of strategies to rethink the use of resources. In contrast, fewer brands reported adopting strategies that reflect an *optimizing* orientation, that is, 82 of 90 brands employ a mix of strategies to optimise the use of extracted resources. See Figure 2 for the number of sustainable brands in Montreal employing each circularity strategy.

Figure 2

Number of brands employing circularity strategies



More specifically, with respect to *rethinking* resource extraction and consumption, this study found that the most frequently implemented strategy by sustainable brands is responsible

procurement (90%), followed by operations improvement (74%), ecodesign (70%), and responsible consumption (49%).

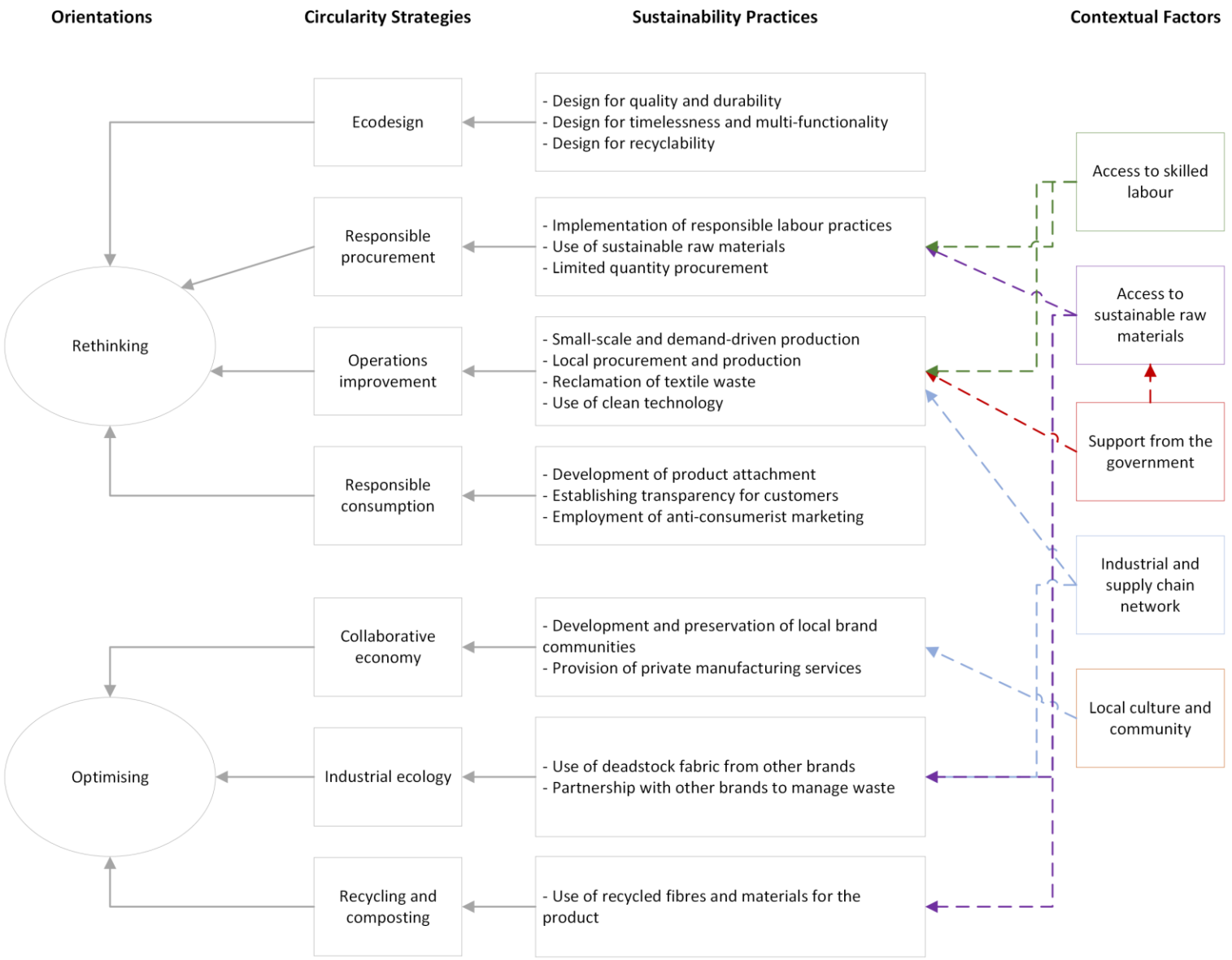
In terms of *optimising* resource utilisation, brands adopted strategies to intensify product use, extend the life of products, and give resources a new life. To increase product use, brands were found to be primarily focused on developing and engaging in the collaborative economy (62%), with only one brand providing a platform for clothing rental services (1%). With the objective of increasing the longevity of clothing and accessories, 20% of brands provide maintenance, repair, and storage services, and 10% have initiated end-of-life take back schemes that enable refurbishment, recycling, and/or second-hand retailing of apparel. Additionally, 8% of brands also donate production overstock, and provide platforms for resale of clothing and accessories. In order to give resources a new life, most brands studied implement practices for recycling and composting (49%), as well as taking advantage of the industrial ecology in Montreal (37%). Currently, no sustainable fashion brands in Montreal have reported implementing the functional economy and energy recovery as circularity strategies.

This study finds that within the sustainable fashion industry in Montreal, brands operationalise the aforementioned circularity strategies through the implementation of 37 unique practices. Of the 37 sustainable practices identified, 26 are oriented towards *rethinking* the consumption of resources and preserving ecosystems, and 11 are focused on *optimising* the use of extracted resources.

In line with the research questions, the following sections have been organised to discuss (1) the practices being operationalised for each circularity strategy, under the rethinking and optimising orientations, and (2) Montreal-specific factors that impact the transition of the industry to the CE. See Figure 3 for a summary of key research findings.

Figure 3

Key research findings



Circularity strategies and practices for *rethinking* Montreal's fashion industry

In order to rethink resource consumption and preserve ecosystems, the brands in this study are employing circularity strategies, such as ecodesign, responsible procurement, operations improvement, and responsible consumption. This study finds that sustainable fashion brands in Montreal operationalise these circularity strategies through a number of unique practices. Table 2 summarises findings about the practices that brands in Montreal have adopted to operationalise CE strategies for the rethinking orientation.

Ecodesign

Our findings reveal that 70% (63 of 90 brands) of the sustainable brands studied use principles of ecodesign to reduce the number of virgin resources used. Of these, 65% (41 of 63) are micro-brands, and 71% (45 of 63) are brands that have been established within the past 15 years. We found that sustainable fashion brands in Montreal operationalise the ecodesign strategy in three distinct ways: (1) design for quality and durability (56% of brands), (2) design for timelessness and multi-functionality (51%), and (3) design for recyclability (1%). Interviewees discussed all three of these practices, including considerations and challenges associated with implementation.

Design for quality and durability. Of the 12 interviewees, 6 emphasised operationalising the ecodesign strategy by designing high quality and durable clothing with construction that facilitates future repairs. The objective of this approach to ecodesign is to ensure long product useful life to limit environmental and social externalities, as well as provide customers with an added economic benefit. The interviewee from Eliza Faulkner explains that "the main [value] is made to last, with quality guaranteed, something that will reduce the cost per wear... because you can wear it for a long time." Similarly, another interviewee from Maison Marie Saint Pierre, explains their clothing to be "so well-made, so well-conceived, [with] very high-quality fabric, very high performing clothes, and they are indestructible. So, people don't need to buy so much" (Maison Marie Saint Pierre, April 2023). Through this ecodesign practice, brands reduce the ecological footprint of clothing, create economic value for customers, and encourage customers to consume fewer products overall.

Design for timelessness and multi-functionality. Findings revealed that 51% of the sustainable brands also prioritise timeless and multi-functional clothing design to stand the test of time, also highlighted by 6 of the 12 interviewees. This is in contrast with the predominantly trend-driven fashion industry which promotes incessant consumption of brand-new clothing. One of the interviewees discussed how social media can elicit an immediate need for purchase, accelerate trend turnover, consumption, and disposal; "With Instagram, you see all the time something new. Oh, I need that, and then the next season, you don't want it anymore" (Créations Gama, February 2023).

In order to reduce seasonal consumption and disposal of clothing, sustainable brands have reported ensuring style longevity through conscious design choices in terms of cuts, patterns, prints, and colour ways. The interviewee from Mercy House Studio explains that to design long-lasting clothes that are not too trendy, "We don't normally use prints. If we do use a print, printed fabric, it's limited. If we go with solid fabrics, we can utilize them again and again and for several different styles" (Mercy House Studio, February 2023).

Another interviewee— from Maison Marie Saint Pierre— highlights the importance of multi-functional design for reduced environmental impact:

> I've done a piece of clothing that I was looking at the other day that was inspired by the kimono, it was called the Marie Saint Pierre Kimono ... and that piece you could wear like 20 different ways... like it was made to play with, and we had it in the collection for so many years. It was an iconic piece for maybe 15 years. (Maison Marie Saint Pierre, April 2023)

In this way, sustainable brands design classic, long-life, and multi-functional pieces that remain relevant through the years despite the transience of trends. This ecodesign practice increases product retention, eliminates the need for customers to consume seasonal clothing, and reduces overall pressure on resource consumption.

Design for recyclability. As a way to reduce consumption of virgin resources, this circularity practice focuses on designing garments with end-of-life recycling considerations. Frank And Oak— the only brand to incorporate all three ecodesign practices— designs garments with circularity in mind, including the elimination of non-recyclable hardware and the use of

mono- and bi-fibres to facilitate recycling. Giving the example of circular denim, the interviewee from Frank And Oak explains the thought process behind this product design practice:

> Whereas I think for us, like our denim, it's like let's first think about how do we break down this product? Here are the constraints that we have. We don't want to use metal rivets because they're hard to recycle. We want to use removable zippers. We want to use 90% cotton. So how do we use all these things and make something that looks really desirable and fun to wear? (Frank And Oak, April 2023)

While the interviewee discusses the organisational focus on "fabric composition and the structure of the garment made in a way to be more easily recycled", there is also serious acknowledgement of barriers in the industry, in that "the recycling technology space is very nascent, especially in textile" (Frank And Oak, April 2023). As a sustainability practice, this design effort aids recycling of extracted resources, and effectively reduces the need to consume virgin resources.

Responsible procurement

Our findings show that 90% (81 of 90) of sustainable brands studied use responsible procurement as a strategy to rethink the use of virgin resources. Sustainable fashion brands in Montreal have been found to operationalise the responsible procurement strategy in six different ways: (1) implementation of responsible labour practices in the supply chain (76% of brands), (2) use of natural and biodegradable fabrics (43%), (3) use of low-impact raw materials (37%), (4) use of ethically sourced fabrics (27%), (5) limited quantity sourcing of raw materials (2%), and (6) demand-driven development of raw materials (1%). Of these six, interviewees emphasised three, including considerations and challenges associated with implementation.

Implementation of responsible labour practices. Our findings reveal that for 76% of sustainable brands in Montreal, the priority is to ensure implementation of ethical labour standards across the value chain, be it in-house or outsourced— also emphasised by 7 of 12 interviewees. In doing so, they have emphasised the assessment and selection of supply chain partners that embody the same environmental and social values as the brand. These labour standards include living wages, safe working conditions, and social benefits for all employees within the supply chain, including textile farmers and garment manufacturing workers. The

interviewee from Elisa C-Rossow Design revealed how the pricing model used predominantly within the fashion industry results in deplorable working wages for garment workers:

> If a designer make[s] a dress at $225, the other designer that is also like prêt-à-porter kind of same client, he's gonna try to match that price or even put it at like $222... So, they're gonna start with the price, and after that, they're gonna be like ... the sewing needs to be less than 10% from that price... The designer [is] gonna go to a studio or atelier de couture, and they're gonna say like I have 54 dresses to make and the budget for each dress is 22 and it's the atelier de couture that's gonna decide if they take it or not. And often they take it because they need a job.... It's how these millions of people are being exploited in the world. (Elisa C-Rossow, June 2023)

In ensuring fair labour practices across the value chain, the interviewee from Frank And Oak emphasised the importance of supplier assessment and relationship management:

> We have really trimmed down [our supplier list] to focus on the ones where we have the most confidence in the quality, our relationship, and of course, in their approach to sustainability, improvement, and social responsibility. Our approach is to have good relationships with suppliers and have visibility on them. (Frank And Oak, April 2023)

Cheap labour and extensive working hours are the hallmarks of fast fashion manufacturing models. By ensuring responsible labour practices across the supply chain, sustainable fashion brands create mindfulness in terms of apparel production and consumption.

Use of sustainable raw materials. Insights from 9 out of 12 interviewees reveal that sustainable brands in Montreal are cognisant of the environmental impact of textile raw material production, thereby focusing on procurement of natural, ecological, and biodegradable (43% of 90 brands), low-impact (37%), and ethically sourced (27%) fabrics.

Through the use of natural materials such as organic cotton, linen, hemp, wool, and bamboo fibres, brands commit to preserving the ecosystem by preventing landfill buildup and pollution of waterways, caused by the use of synthetic materials. The interviewee from Créations Gama explains their use of animal fur as a biodegradable raw material which "if you throw it away, it's like a leaf" (Créations Gama, February 2023). Another interviewee reasons that even if clothes made of natural materials are not reused and are disposed "in third world countries with

mountains of clothing", they will eventually degrade, and although "it is not a positive impact, it is much less negative than anything synthetic" (Valérie C. Design, June 2023).

In terms of low-impact fabrics that eliminate the exorbitant use of water and chemicals in the farming process, brands such as Frank And Oak report the use of hemp that "consumes 50% less water than cotton" and is "grown without pesticides" (Frank And Oak, n.d.-c, p. 1). However, the interviewee from Eliza Faulkner design also pointed out that the use of low-impact raw materials may have design implications and pose a trade-off between "aesthetics and sustainability":

> For example, linen and hemp are really good for water consumption. But they don't hold color very well, or get very strong, bright colors. So, if you want bright, strong colored prints, well, then you have to go [with] cotton, if you want a certain finish. (Eliza Faulkner Design, January 2023).

Particularly to preserve the sanctity of the ecosystem, sustainable fashion brands are procuring vegan, cruelty-free, and fair-trade raw materials, with an outerwear brand expressly stating that "harming animals is never trendy, nor will it ever be" (Noize, n.d., p. 1).

While brands are increasingly emphasising procurement of sustainable raw materials to reduce the overall ecological damage associated with farming practices, they have also reported barriers to implementation, including restricted access to sustainable fabrics and lack of transparency within the supply chain.

Barrier: Limited access to new, sustainable raw materials. Although growing in popularity, 6 out of 12 interview participants have cited restricted access to new sustainable fabrics in Canada, in terms of lack of local production and limited choice of suppliers. One of the interviewees discusses the struggles of sourcing sustainable raw materials locally:

> I think the challenges of my work are finding suppliers in Canada. It is just a huge struggle to find sustainable textiles at a reasonable price. Whereas in the States or elsewhere in the world, the accessibility of organic cotton is really something that is easy. (Jennifer Glasgow Designs, May 2023)

Interviewees have also reported that many of the suppliers that do produce textile locally have minimum order quantities that are often too large for the production run of small sustainable fashion brands. While the interviewee from Hernest Project echoes this sentiment,

thereby justifying the brand's strategy to source fabric and produce garments in Portugal, she recognises that the global economic downturn might be forcing the situation in Canada to change.

> At that time [2018], no one would do the minimums. Like the minimums were just outrageous ... as a smaller start up, I just couldn't reach those minimums. But that has changed a lot in the last few years. I'm still a small batch producer and a lot of Canadian production houses still probably won't work with me. But in the last 18 months, business has really slowed down, so now we're finding that I'm getting reached out to by manufacturers that, at one time, wouldn't take me. (Hernest Project, June 2023)

While access to sustainable textile is slowly growing, 31% (28 of 90) of brands are mitigating this challenge by using deadstock and end-of-roll fabrics from other designers and manufacturers in Montreal's garment industry. Additionally, 39% (35 of 90) of brands are using recycled fabrics from existing synthetic waste, such as nylon and polyester, and recycled fibres from discarded industrial and ocean waste, such as fishing nets and PET bottles. There are 48 brands that use a mix of new, sustainable and old, recycled raw materials. 19 brands from the sample source only new raw material, and a total of 9 brands rely solely on deadstock or recycled fabrics for their manufacturing.

Barrier: Supply chain opacity. To create transparency on fair and responsible procurement, 37% (33 of 90) of brands also provide information on certifications for their suppliers, for example, Business Social Compliance Initiative (BSCI)[5] and Global Organic Textile Standard (GOTS)[6]. However, this objective of establishing organisational and supply chain transparency does not come without challenges. The interviewee from Hernest Project explains these barriers:

> Within the supply chain, when you're trying to be more transparent and more sustainable, the biggest challenge is working within a system that is so old and so ingrained in the way that they do things, that even the smallest changes are very difficult... I think brands of our size or whatever are super innovative in the way that they approach business

[5] Business Social Compliance Initiative: https://www.textilestandards.com/standards/43-bsci
[6] Global Organic Textile Standard: https://global-standard.org/

> within a system that is very difficult to work in, very difficult to change... Finding the right suppliers that have all the right certifications and the right transparency in the supply chain, is very complex. (Hernest Project, June 2023)

Findings show that some brands attempt to combat opacity within the supply chain by using material costs as a metric for supplier responsibility. An interviewee explains this tactic:

> We don't buy from certain places or from certain mills that have an ill repute. We consciously pay a higher price. We can have the option of the same fabrics, but one is cheaper from a less reputed mill and the other is more expensive, we will choose the more expensive one. (Eliza Faulkner Designs, January 2023)

Limited quantity procurement. Finally, part of the focus for responsible procurement is also on limited quantities so as to prevent unnecessary resource consumption and stockpiles, as cited by 2 of the 12 brands interviewed. The interviewee from Hannah Isolde discusses how she strives to "not buy a lot of upfront fabric" to limit inventory buildup (Hannah Isolde, February 2023). However, our findings show that this is a persistent challenge for micro-brands as most fabric suppliers in Montreal have been found to have minimum order quantities that are often still too large for sustainable fashion brands. The interviewee from Odeyalo explains how collaboration amongst brands allows them to meet the minimum order quantity to locally source sustainable fabrics:

> There's this company called Montloup and they do pre-sales of fabric, it's common sale, so everyone can go and purchase a little bit of something so they have a big enough quantity to produce it... and then we can have access to some sustainable fabric like bio-cotton. (Odeyalo, March 2023)

By sourcing raw materials and inputs in limited quantities, brands reduce the industry's ecological impact by minimising the pressure on extraction of virgin resources.

Operations improvement

Our findings reveal that 74% (67 of 90) of sustainable brands studied are working to streamline their manufacturing processes with the objective of minimising resource consumption and preserving the natural ecosystem. Sustainable fashion brands in Montreal have been found to operationalise the operations improvement strategy in twelve different ways: (1) small-scale

production (39% of brands), (2) local procurement and production for transport efficiency (32%), (3) demand-driven product development (24%), (4) reclamation of waste material (19%), (5) clean technology for reduced water and energy consumption (14%), (6) clean technology for reduced chemical effluents (13%), (7) local production for quality control (12%), (8) textile waste minimisation (11%), (9) carbon off-setting initiatives (8%), (10) zero-waste workplaces (6%), (11) clean technology for reduced carbon emissions (4%), and (12) responsible shipping methods for reduced carbon emissions (4%). Of these twelve, interviewees discuss four major focus areas, including considerations and challenges associated with implementation of these practices.

Small-scale and demand-driven production. To counter the fashion industry status quo of overproduction, 39% of sustainable brands in Montreal have been found to restrict their batch sizes and number of collections per year. The interviewee from Elisa C-Rossow, amongst 5 others, emphasises the importance of small-scale production in terms of sustainability:

> I think one of the biggest problems, in my point of view, is the sous production, the overproduction. If we were not over producing, we will not have like mountain of clothing in the desert. We will not have millions and millions of people not paid for the work and paid poorly. We will not spend all that carbon footprint. My first thing in my company was I don't want to over produce... in Chabanel... they are made on a really tiny production. For example, for Fall, I have a dress and a top that I'm going to make two XS, two Small, two Medium, one large, one XL. (Elisa C-Rossow, June 2023)

In additional efforts to minimise apparel waste, 24% of sustainable brands have reported the use of a demand-driven production model, i.e., made-to-order manufacturing, that reduces the risk of unsold stocks, through "bespoke, intentional fitting" (Mercy House Studio, n.d., p. 1). However, interviewees have reported high lead time from customer order to final product delivery, since there is no inventory to immediately ship from. The interviewee from Hannah Isolde shares that the brand's made-to-order model is "tricky because you don't have things to sell all the time" (Hannah Isolde, March 2023). Relatedly, the interviewee from Hernest Project has envisioned growth and development of organisational capacity to "produce clothes for people in a timely way" and "bridge the gap between a full pre-order model that takes 10 to 12

weeks to deliver, to a model where we're making clothes for people...with a 10 to 12-day delivery time" (Hernest Project, June 2023).

Through these practices of small-scale product development, despite their challenges, brands are proactively reducing the need to extract more resources and minimise the environmental damage caused by dumping of overstock and carbon emissions associated with overproduction of clothing.

Local procurement and production. Findings show that 32% of sustainable brands in Montreal focus on local procurement and production to minimise carbon emissions from transportation and logistics. The interviewee from Mercy House Studio explains that they "purchase fleece from local mills, so that prevents transportation cost from overseas, and for sure, just the carbon emissions" (Mercy House Studio, February 2023). As mentioned by 9 interviewees, the implementation of this circularity practice may, in part, be made possible due to the existence of the local garment industry that provides sustainable brands with access to raw materials, machinery, and manufacturing teams.

Additionally, this study finds that 12% of sustainable brands have emphasised 'near sourcing' and local manufacture for greater quality control and agility in troubleshooting. Jennifer Glasgow Design's website also states: "By working with local workers, we have the opportunity to have our eyes on every step of production. We control quality from textiles to cutting to sewing to shipping" (Jennifer Glasgow Design, n.d.-a, p. 1). In the same vein, the interviewee from Odeyalo highlights the advantages of in-house production:

> It's really important for me that everything is done in-house, and that people have their opinions too. They tell me if something is not working while they are sewing, so we kind of troubleshoot things on the spot, and I prefer that. (Odeyalo, March 2023)

Through local networks, brands optimise product transportation, for reduced ecological impact, and develop organisational agility and responsiveness to maintain quality standards for clothing— the lack of which would, otherwise, result in textile waste.

Reclamation of textile waste. In order to minimise waste within the manufacturing process, we found that 19% of sustainable brands are reclaiming leftover materials and fabric off-cuts for other clothing pieces and accessories, such as quilted jackets, hats, tote bags, and

scrunchies. The interviewee from Odeyalo, amongst 4 others who implement this practice, explains this circularity practice:

> Some of them we repurpose ourselves, for instance, we made wool hats, and with the balaclavas, the way the pattern is made, we always have little squares. So, we use all these little squares of our production to make the balaclavas. And so, in the end, there isn't any scrap left. (Odeyalo, March 2023)

However, the interviewee also stressed that repurposing scraps and reintroducing them into production is, in fact, a time-consuming endeavour that involves a lot of "energy", "costs way more money because it [the scraps are] so small", and requires creative effort to "build a story" around it (Odeyalo, March 2023). When asked about envisioned growth for the brand, the interviewee mentioned having a department dedicated to reclaiming manufacturing waste including "an extra seamstress and an extra cutting table and extra everything to repurpose those scraps" (Odeyalo, March 2023). Sustainable brands, through these creative waste management practices, ensure the maximum utilisation of resources while reducing further ecological detriment.

Use of clean technology. Of the sustainable apparel companies studied, 14% are now harnessing advanced technology to reduce water and energy consumption. Interestingly we found that of the 13 brands that employ this circularity practice, 9 are small, medium enterprises and large companies, e.g., Tristan, Gildan, Gorski, and Yoga Jeans, and only 4 are micro-brands, including Norden and Mimi & August. Frank And Oak introduces Hydro-less and Dip-less processes on their website, that focus on reduced consumption of energy, water, and chemicals (Frank And Oak, n.d.-b, p. 1).

We also found that 13% of sustainable apparel brands prioritise reduction in the use of toxic dyes, bleaches, and other chemicals within the manufacture process. The interviewee from Eliza Faulkner elaborates on the growing concern about chemical effluents in the fashion supply chain: "We are working on natural dyeing...all the finishers are trying to find ways to make their dyeing and finishing more natural, so that is coming along" (Eliza Faulkner, January 2023).

Further, this study shows that only 4% of sustainable brands report reduction in carbon emissions from clothing manufacture, through the use of alternative fuel and renewable resources. Gildan, a publicly listed sustainable apparel brand, has pledged to reduce "reliance on

fossil fuels", and at present, "39% of total energy comes from biomass as a low carbon substitute" (Gildan, n.d., p. 1).

Through these efforts, sustainable brands are rethinking the consumption and utilisation of natural resources, reducing components that pollute waterways, and prioritising the preservation of ecosystems.

Responsible consumption

Our findings suggest that individual consumers have a pivotal role to play in the overall reduction in product and resource consumption. In line with this objective, 49% (44 of 90) of sustainable brands in Montreal promote responsible consumption amongst consumers through five distinct practices: (1) development of product attachment (23% of brands), (2) awareness for post-purchase care (13%), (3) provision of transparent information to customers (12%), (4) employment of anti-consumerist marketing (7%), and (5) promotion for the sale of slightly defective garments (7%). Of these five practices, interviewees emphasised three, including considerations and challenges associated with implementation.

Development of product attachment. Findings show that 23% of sustainable brands establish product attachment with customers through made-to-order pieces that create a unique, one-of-a-kind garment, by responding to a particular customer need such as inclusive sizing, and/or by offering high service standards to build relationships (Hannah Isolde, February 2023; Valérie C. Design, June 2023).

An interviewee emphasises how overtime individuals have grown to under-value and over-consume clothing: "I was really sad to see how through the decades we lost completely the value of clothing. We consume clothing, how we consume toilet paper or toothpaste" (Elisa C-Rossow, June 2023). Through designing and delivering curated and unique clothes, brands aim to re-establish the "value of clothing", to slow down consumption and limit the resultant negative environmental impact. The interviewee also explains how 'sur-mesure' or customised clothing can lead to product retention: "Through made-to-order and made-to-measure, I'm ensuring the fact that the piece is gonna be perfect on the client...the client is most likely to keep it forever" (Elisa C-Rossow, June 2023).

This objective of emotional durability and product attachment can also be achieved by brands that use deadstock fabrics. The interviewee from Mercy House Studio explains how they

use end-of roll fabrics from other designers to make "limited edition items, which is also nice, because in fashion, you want to be unique" (Mercy House Studio, February 2023). Out of 12, 6 interviewees have asserted that through this circularity practice, sustainable brands establish lasting relationships between the product and consumers to reduce the speed of consumption within the fashion industry.

Establishing transparency for customers. We found that out of 90 brands studied, 12% establish transparency in terms of cost breakdowns and circularity initiatives, to justify the higher price tags for sustainable clothing and create awareness for customers for responsible purchases. Brands, such as Frank And Oak and Hernest Project, provide supply chain sustainability information through their website, Brand Impact Report, and Supplier Code of Conduct. Out of 90 brands, 37% of brands also provide proof of responsible procurement and supply chain traceability through supplier certifications such as OEKO-TEX, Global Organic Textile Standard (GOTS), Business Social Compliance Initiative (BSCI), Forest Stewardship Council (FSC)[7], and Responsible Down Standard (RDS)[8] among others.

Interviewees maintained that sustainable brands do not aim to compete with fast fashion pricing since there is a higher cost associated with their offering, including responsibly sourced raw materials and living wages for garment workers. By actively informing consumers that "there is a price to pay for making it [clothing] so good", sustainable brands may incite mindful consumption and willingness to pay (Maison Marie Saint Pierre, May 2023). In a blog post titled "How to dress responsibly", Valérie C. Design stresses the importance of fair pricing: "Tell yourself that if you paid only a few dollars for your garment, it must have cost a lot more (in terms of the quality of life or work) to those who produce it" (Valérie Canuel, n.d., p. 1).

One brand, Marigold, has developed transparent pricing labels for garments which include the cost of materials, manufacturing, research and development, and operational overheads (Marigold, n.d.). The label also outlines other costs included in the selling price such as salaries, commissions, marketing, and packaging costs (Marigold, n.d.). To encourage product attachment between the garment maker and wearer, the label also identifies the individuals responsible for product development, grading, cutting, sewing, and other related services

[7] Forest Stewardship Council: https://fsc.org/en
[8] Responsible Down Standard: https://textileexchange.org/responsible-down-standard/

(Marigold, n.d.). The interviewee affirms that establishing transparency is an attainable goal for other responsible brands in Montreal only "if they would take the time to make it happen, because they have nothing to hide" (Marigold, March 2023).

Despite challenges of institutionalised opacity in the fashion industry, sustainable brands are striving to develop transparency in the hopes of eliciting conscious consumption of products.

Employment of anti-consumerist marketing. Findings revealed that 7% of sustainable apparel brands actively promote responsible consumption through efforts such as no sales incentive, promoting thrifting and swapping, and encouraging customers to prioritise quality over quantity of fashion consumption. The interviewee from Valérie C. Design highlights the plethora of clothing in circulation within the industry and how this can be tackled through "second-hand shopping", "swapping with friends", and "reusing clothes you already have" (Valérie C. Design, June 2023). Another interviewee explained how Frank And Oak, repositioned as a brand to "inspire better living", does so by engaging with customers on social media with "tips for going thrifting in thrift stores, [and] not buying new clothes" with the intent of promoting "more conscious consumption" (Frank And Oak, April 2023).

The interviewee from Jennifer Glasgow Designs also discussed the number of ways individuals can approach sustainable consumption:

> You can buy a $10 t-shirt, and then you can invest your money in a great pair of jeans, or you can buy vintage, and then buy a great cardigan that is organic. There are different ways to work towards that. (Jennifer Glasgow Designs, May 2023)

By employing this circularity practice, sustainable brands emphasise the role of customers in the environmental footprint of clothing, and propose alternative means of fashion consumption.

Table 2. Rethinking the fashion industry in Montreal: Circularity strategies and practices

Objectives	Strategies	Observed practices	Number of brands (n=90)	In the literature (Y/N)	Exemplar brand offering
Reduce resource consumption and preserve ecosystems	Ecodesign	Design for longevity through durability and quality	50	Yes	All our products are made with best-in-class materials and the utmost care. Norden is committed to repair or replace all products with material or fabrication defects within 2 years of purchase. (Norden, n.d.)
		Design for longevity through timelessness, simplicity, multi-functionality	46	Yes	Our signature style is classic with artistic flourishes. Strong shapes, bold form and colour carry our inspired designs and keep them alive for years to come. Designing outside of short-lived trends is essential to making clothes that will be worn for as long as they hold together. (Jennifer Glasgow Design, n.d.-a)
		Design for recyclability (e.g., use of mono-fibres, elimination of hardware)	1	Yes	Rivets, the metal studs found on traditional jeans, cannot be salvaged and complicate the recycling process of denim clothing. As a way of making our jeans circular, we are popping all of the rivets off our denim so that they can be easily recycled. Over 70% of our styles are made using mono-fibre and bi-fibres. The more fibres are mixed together in a garment, the harder it will be to recycle. That is why we strive to keep the percentage of multi-fibre pieces to less than 30% of our collection. (Frank And Oak, n.d.-b)
	Responsible procurement	Implementation of ethical labour practices including supply chain partnerships with shared values and ethics	68	Yes	Our small-scale local production and all our suppliers adhere to the requirements outlined in International Labour Organisation's Declaration on Fundamental Principles and Rights at Work. This includes but is not limited to: no child or forced labour, appropriate working hours, paid annual leave, maternity leave, the right to collectively bargain, and the elimination of discrimination. (Bedi Studios, n.d.-b)

Objectives	Strategies	Observed practices	Number of brands (n=90)	In the literature (Y/N)	Exemplar brand offering
Reduce resource consumption and preserve ecosystems *(continued)*	Responsible procurement *(continued)*	Use of natural, ecological fibres, or biodegradable fabrics (e.g., organic cotton, linen, hemp, algae and cellulose fibres)	39	Yes	They are biodegradable. Organic textile breaks down naturally over time, while synthetic fibers become only permanent waste. In addition to releasing toxic gases into the air, synthetic fibers have a direct impact on climate change. Ecological fibers are mostly hypoallergenic, gentle on the skin, naturally antibacterial, and do not contain chemical irritants. (Message Factory, n.d.)
		Responsible sourcing of raw materials including low-impact organic farming without pesticides and exorbitant water utilisation	33	Yes	Select tops and bottoms are made using Better Cotton. The Better Cotton Initiative (BCI) is the largest cotton sustainability program in the world. Better Cotton means producing cotton in a way that cares for the environment through processes that minimize the negative impact of fertilizers and pesticides, and care for water, soil health and natural habitats. (Tristan, n.d.)
		Ethical sourcing of raw materials including vegan, cruelty-free, fair trade materials such as down alternatives	24	Yes	Loving animals isn't just a fad. Harming animals is never trendy, nor will it ever be. From the outset, Noize was dedicated to doing better. Instead of relying on animal by-products materials, our entire apparel line is crafted from textiles like vegan leather, wool, and fur. These ethical choices have earned us the prestigious PETA-certified designation. (Noize, n.d.)
		Sourcing of raw materials in limited quantities to prevent stockpile	2	No	"Everything is mostly made-to-order... and because of that I also try not to buy a lot of upfront fabrics." (Hannah Isolde, February 2023)
		Development of raw material as per manufacturing requirement	1	No	"I work with Italy in fabric supply, and I develop with them and they develop for my own colour, so they develop whatever I order. We work on all the technical aspects of it." (Maison Marie Saint Pierre, April 2023)

Objectives	Strategies	Observed practices	Number of brands (n=90)	In the literature (Y/N)	Exemplar brand offering
Reduce resource consumption and preserve ecosystems ***(continued***	Operations improvement	Small-scale production and limited batch size	35	Yes	We keep our quantities low to avoid overproduction. We are aspiring to a more human and eco-friendly way of creating fashion. (MAS Montreal, n.d.)
		Ensure transport efficiency and low carbon footprint (e.g., regional procurement and local production, mode of transportation)	29	Yes	Almost all of her materials are locally sourced, from fabrics down to thread and zipper—all produced by local workers in Montreal's vibrant fashion sector, and requiring less fossil fuel for transport. (Katrin Leblond, n.d.)
		Demand-driven product development (e.g., Made-to-measure or made-to-order manufacturing models)	22	Yes	Each piece is created on demand by hand in our Montreal workshop. Unlike the big "Fast Fashion" brands, FDG does not participate in clothing waste, each piece created is sold. (FDG Design, n.d.-b)
		Reclaim part of or entire material to reintroduce into the manufacturing process *(from own brand)*	17	Yes	Remnants [of fabric] can be reused for subsequent orders, or if the pieces are too small can be used for smaller projects like patchwork pieces, hair bows or scrunchies. (Hannah Isolde, n.d.)
		Use of clean technology for reduced water and energy consumption in the manufacturing process	13	Yes	Hydro-Less Process Uses up to 79% less energy, up to 50% fewer chemicals, and 95% less water than standard methods. (Frank And Oak, n.d.-b)
		Use of clean technology for reduced chemical effluents (e.g., toxic dyes and bleaches)	12	Yes	Environmentally friendly dyes and protective agents, as well as recycled materials are used for our packaging materials. (La Candienne, n.d.)
		Local production - quality control and ease of troubleshooting	11	No	By working with local workers, we have the opportunity to have our eyes on every step of production. We control quality from textiles to cutting to sewing to shipping. (Jennifer Glasgow Design, n.d.-a)
		Minimise textile waste (e.g., through precise cutting techniques)	10	No	We strive to reduce fabric waste by utilizing low-waste cutting techniques and creating limited collections with remaining deadstock and end-of-roll fabric. (Mary Young, n.d.)

Objectives	Strategies	Observed practices	Number of brands (n=90)	In the literature (Y/N)	Exemplar brand offering
Reduce resource consumption and preserve ecosystems *(continued)*	Operations improvement *(continued)*	Practices to off-set carbon emissions	7	Yes	We make donations to cover the planting of the tree equivalent replacement to cover the emissions created by our email marketing. (Elisa C-Rossow, n.d.)
		Zero-waste workplaces (e.g., upcycled office furniture, energy conservation, waste management)	5	No	Sustainable clothes need sustainable foundations. Our stores and offices are built conscientiously in partnership with Canadian artisans, using recycled materials and creating minimal waste. Our furniture is locally sourced or upcycled as much as possible. (Frank And Oak, n.d.-b)
		Use of clean technology for low carbon emissions (e.g., use of renewable resources over fossil fuel)	4	Yes	Gildan is committed to using energy efficiency initiatives to minimize our greenhouse gas (GHG) emissions whenever and wherever possible. That's why we work to increase energy efficiency across our operations by reducing our reliance on fossil fuels and favouring more sustainable alternative energy sources and production processes. 39% of our total energy comes from biomass as a low carbon substitute. (Gildan, n.d.)
		Implement responsible shipping methods via bicycle and electric vehicles locally	4	No	We also offer bike or electric car deliveries, in the Montreal area, thanks to LVM. (Odeyalo, n.d.)
	Responsible consumption	Establishing product attachment for consumers through premium service, curation, and customisation of garments	21	Yes	Our adored clients feel good about purchasing ethical, hand-made, beautiful pieces, crafted with love and care. Ours is a business of love and care, with products imagined and curated to live and grow with you. (Jennifer Glasgow Design, n.d.-a)
		Create awareness for post-purchase care (e.g., reduction in frequency and temperature of laundry, mending etc.)	12	Yes	Reduce your carbon footprint Washing your clothes less and wearing them more can actively help reduce your carbon footprint. Excessive washing and drying wears them out. Instead, remove stains manually, and air the clothes to freshen up after every use. (Soia & Kyo, n.d.)

Objectives	Strategies	Observed practices	Number of brands (n=90)	In the literature (Y/N)	Exemplar brand offering
Reduce resource consumption and preserve ecosystems *(continued)*	Responsible consumption *(continued)*	Provide transparent information to customers in terms of pricing, supply chain traceability, sustainability, and social responsibility initiatives	10	Yes	We rely on the highest globally recognized and well-developed standards of certifications to assess our supplier's commitment to the fair treatment of people. We also source from Tier 1 & 2 suppliers where Government regulation plays an active and audited role in workers' rights. (Hernest Project, n.d.)
		Promote responsible consumption through anti-consumerist marketing (e.g., limited to no sales incentives, thrifting etc.)	6	Yes	Not buying new clothes. For example, swap clothes and accessories with your friends and family. Shop at second-hand stores. (Valérie Canuel, n.d.) "I don't want to rely on constant markdowns and sales ... at the end of the season." (Hannah Isolde, February 2023)
		Establish transparency in sale of slightly defective items (e.g., "Almost Perfect Ones")	6	No	Our flaws | From -50% to -70% Fabric fault, stain, human error, etc. There are many factors that prevent us from selling certain parts to you at the regular price. (Eve Gravel, n.d.)

Circularity strategies and practices for *optimising* Montreal's fashion industry

In order to optimise the use of extracted resources, sustainable brands make efforts to intensify product use, extend the life of products and components, and give resources a new life. Driven by these objectives, apparel brands are implementing circularity strategies such as collaborative economy, short-term renting, maintenance and repair, donations and resale, refurbishment, industrial ecology, and recycling and composting. Of these 7 strategies, interviewees have emphasised and discussed four areas of focus, including considerations and barriers associated with implementation. Table 3 summarises findings about all the practices that brands in Montreal have adopted to operationalise CE strategies for the optimising orientation.

Collaborative economy

Our findings reveal that 62% (56 of 90) of sustainable brands in Montreal use principles of the collaborative economy to intensify the optimal use of extracted resources. In general, the collaborative economy seeks to maximise the use of goods and services in circulation, with a focus on peer-to-peer sharing platforms at the customer level. Our research found that there are operationalised practices that promote sharing of resources at the production level as well. Sustainable fashion brands in Montreal operationalise the collaboration strategy via two distinct practices: (1) economic and social value creation for local brand communities (62%), and (2) provision of private manufacturing services (2%).

Development and preservation of local brand communities. This study finds that being based out of Montreal allows brands access to the culture, technical expertise, artisan skills, and infrastructural resources of the once-formidable garment industry. A large number of sustainable apparel companies (56 of 90) emphasised the importance of nourishing and preserving these local brand communities in an attempt to restore Montreal's garment industry to its former repute. One interviewee explains this focus:

> I really like personally having this warm collaborative business, like long term business arrangement with the people I work with. One of our mandates is to nourish everyone we touch, not just the people who consume our goods, but everyone who works for us, in any way associated. We want to nourish, we want to kind of leave things better than we found them. (Eliza Faulkner, January 2023)

Interviewees have expressed optimism in the possibility to "work collaboratively, build the skills, and find the machinery" in Montreal, because of the presence of a strong industrial and supply chain network (Eliza Faulkner, January 2023). However, 6 of the 12 interviewees have also stressed on the declining expertise and workforce within the sector. They cited tough industrial and economic environments, aging workforce, and the disconnect between educational curriculums and industry requirements as main contributing factors.

In terms of evolution of the local industry, an interviewee explains that the "mass exodus" of the 1980s and 1990s meant that a lot of people and machinery left at the same time, including knitting mills in the garment district (Jennifer Glasgow Designs, May 2023). This study also finds that trade liberalisation and the elimination of "quotas and tariffs in 2001" have accelerated the decline of the local industry, as low-cost garments from overseas inundated the market (Eliza Faukner, January 2023). Another interviewee criticized how insufficient investment in the manufacturing sector by the government, financial institutions, and private equity has resulted in Montreal losing its status as "the most important pole of manufacturing in North America" (Maison Marie Saint Pierre, April 2023).

Participants have also identified economic insecurity in the industry as one of the reasons access to local expertise is continually regressing. This study finds that inadequate financial gain discourages people from entering the industry and forcing people within the industry to "re-educate or find new jobs", resulting in a "huge lack of technical prowess" (Jennifer Glasgow Design, May 2023). Another interviewee shared their concern with the dominant pricing model which allots only 10% of cost for sewing: "If there is no person, there is no piece at the end. How can you even treat the sewing person at bas de l'echelle [bottom of the scale] ... for me, all of my pieces, it's probably 30% into the sewing." (Elisa C-Rossow, June 2023). Relatedly, the interviewee from Maison Marie Saint Pierre has recommended comparable wages for sewers as other manual workers to attract labour force into the industry.

While many acknowledged the presence of technical skills and know-how in Montreal historically, interviewees from Créations Gama, Elisa C-Rossow, Jennifer Glasgow Designs, and Marigold also report that seamstresses, artisans, and other apparel technicians are retiring and have no workforce to train and pass on their knowledge to.

> All the artisans that I work with, there are a few who took their retirement and now it is really bad where the Montreal fashion industry is, for local production, because they are

> all going for retirement...and I will have no younger people to take their following, there is nobody after that. We have to do something here because 20 years ago, we had a lot of expertise. (Marigold, March 2023)

Finally, interviewees pointed out the silo-based functioning of fashion school programs, that do not cater to the pressing needs of the industry, i.e., the requirement for technical skills:

> The schools that we have are concentrated on industry, so larger companies. They sort of direct you towards larger corporations and doing things like tech packs and less about being a seamstress. (Jennifer Glasgow, May 2023)

Another interviewee echoes that "every student wants to be fashion designer like Jean Paul Gaultier", however, there is a need to "regain the value of artisanal work in the fashion industry" starting from the roots, that is, introducing fashion students to other technical jobs within the industry, besides fashion designer. This will reduce the "real disconnection in the jobs available and the jobs they want to do". (Elisa C-Rossow, June 2023).

With these considerations, 62% of sustainable fashion brands in Montreal focus on local production to create social and economic value to support local artisan communities, skilled labour force, and craftsmanship. In doing so, valued human resources and expertise will be shared and utilised to better manage the limited supply of skilled labour resources, mitigate organisational risk, and contribute to the local circular economy.

Provision of private manufacturing services. We also found that 2 brands —Mercy House Studio and FDG Designs—are offering other sustainable brands the use of their infrastructure and manufacturing facilities to produce apparel, with flexibility in order quantities. The interviewee from Mercy House Studio explains this initiative to encourage collaboration amongst producers and local sustainable production:

> To build a factory so that we can have services for people who want to build, for slow fashion. So, let's say a designer comes and they want to make a very small collection, and they don't need hundreds or thousands of pieces, they can just order ten or whatever they feel is necessary for them...The approach that we are looking at right now is more of a factory base so that more artists can have access to the same approach...designers working off the same values. (Mercy House Studio, February 2023)

This study finds that brands are contributing to the development of the local (circular) economy through this collaborative practice—shared use of resources and infrastructure at the producer-level.

Industrial ecology

This study found that 37% (33 of 90) of sustainable brands included in this research undertake industrial symbiosis initiatives to give resources a new life. This strategy has been operationalised by Montreal-based sustainable brands in two different ways: (1) sourcing and repurposing deadstock, waste materials, and by-products from other brands (31%), and (2) partnering with other organisations to effectively manage their own leftover materials (11%).

Use of deadstock fabric and waste materials from other brands. Our findings show that 28 of 90 sustainable brands utilise Montreal's established industry network in Chabanel, which provides ready access to deadstock and waste materials to reintegrate into new production. Out of these brands, 5 solely use deadstock materials and by-products of other industries in the production process. Interview and website content illustrate the sourcing strategy and choice of raw materials for some of these sustainable brands:

> I use deadstock and leftover materials from some of the larger brands here in Montreal, so I really focus on not buying completely new, and reusing what is already there. (Marigold, March 2023)

> I started using deadstock when I saw all the amazing fabrics available locally at dealers in Montréal. There is still a pretty big garment industry here and the leftovers from bigger brands are everywhere, so I use that to produce locally and keep my supply chain very short. (Eliza Faulkner interview for (Matthew Velasco, 2022)

However, interviewees have also discussed trade-offs of using deadstock fabric for the production of new clothing, in terms of design or technical specifications. The interviewee from Hannah Isolde discusses the challenge with shopping deadstock or leftovers:

> I do try and shop deadstock, but it doesn't always have what I want and the quality. So, it [requires] this kind of balance, like this deadstock fabric looks cool and interesting, but how is the integrity? Is it going to fall apart after a few washes, therefore making the product ultimately unsustainable? (Hannah Isolde, February 2023)

Despite the associated challenges, by sourcing deadstock fabric and materials headed for the landfill, brands reduce the overall environmental footprint of their production.

Partnership with other brands to effectively manage waste. To give resources a new life, we found that 11% of brands also play their role in the circular economy by partnering with other brands and organisations to sell or donate their post-manufacturing scraps and leftover materials. For example, Jennifer Glasgow Design organises a Textiles and Notions Sale to offer high quality leftover fabrics to other designers and creatives (Jennifer Glasgow Design, n.d.-b). Odeyalo has been partnering with Le Point Visible, since 2009, to refashion its material leftovers into quilts (Odeyalo, 2020). The brand also collaborates with Atelier Retailles to transform fabric scraps into paper (Odeyalo, 2020). The interviewee from Elisa C-Rossow also explains the brand's zero waste vision:

> I'm having the lowest waste possible when I cut, but even if there is a bit of leftover, I keep them in the bag in the back. So that's all the pieces from linen and cotton, organic cotton, kapok ... so, I bring those, those bags of little pieces of fabric to a local artisan that makes handmade paper out of fabric scraps. So that's the paper [holds up paper] she gives me and that [becomes] the price tags on the clothing. (Elisa C-Rossow, June 2023).

From procurement of deadstock fabrics to providing their own leftovers to other organisations, these brands are contributing to the circularity of resources within the industry.

Recycling and composting

Our findings reveal that 49% (44 of 90) of sustainable brands implement the recycling and composting strategy to replace the use of virgin materials in the manufacturing process, and give existing resources a new life. This strategy has been operationalised by Montreal-based sustainable brands in two ways: (1) use of recycled fibres and materials for the product (39%), and (2) use of recycled, reusable, and compostable materials for the packaging (28%). Of these two, interviewees discuss the former practice in detail.

Use of recycled materials for the product. For the product line, 39% (35 of 90) of sustainable brands in Montreal use recycled fibres. Out of these 35 brands, 3 rely solely on recycled raw materials for their production process, including recycled cotton, wool, nylon, and polyester. Other recycled materials include Econyl® from regenerated fishnets, discarded

industrial waste such as airline seats and seatbelts (Bedi Studios, n.d.-a), recycled polyester from PET bottles, and Seawool® from recycled polyester and oyster shells (Frank And Oak, n.d.-c). With an emphasis on closing the loop, the interviewee from Frank And Oak discusses important considerations for recycling, including innovation and supplier collaboration:

> We are very proud of some of the innovative fabrics that we use. We don't have any exclusive or proprietary rights to it, I think we have just done more work to find them and work with those mills. We are pioneering, we are using Kapok, Seawool, and SeaCell. Around 2020, we had a line of Seawool that was one of our first, and we launched it, it sold okay, but it was very scratchy, the texture was not pleasant to wear. So, we really worked with our suppliers and made it a priority to say like, how do we make it softer? How do we make it looser? [We] iterated on that material to make it really unique. (Frank And Oak, April 2023)

While there is a growing prioritisation of recycling and circulating existing materials, only one brand— Frank And Oak—is incorporating this within the design process itself. As discussed earlier, designing garments with mono- or bi-fibres and denim jeans without metal rivets optimises dis-assembly and recycling, and minimises residual waste from clothing (Frank And Oak, n.d.-b). Overall, given how recycling and re-fibering technologies are still considered to be in the infancy phase, the use of recycled materials as a circularity practice by nearly half of the brands is promising.

Table 3. Optimising the fashion industry in Montreal: Circularity strategies and practices

Objectives	Strategies	Observed practices	Number of brands (n=90)	In the literature (Y/N)	Exemplar brand offering
Intensify product use	Sharing/ collaborative economy	Create economic and social value through development of local brand communities and utilisation of skilled artisan groups and craftsmanship	56	Yes	At the workshop, we are committed to offering you quality confections, produced locally, by seamstresses and dressmakers who have an eye for detail. We have had the chance, over the past 15 years, to develop privileged relationships of trust and friendship with our collaborators in Montreal. (Eve Lavoie, n.d.)
		Provide private label services to support local sustainable brands	2	No	Clothing Production Management FDG Design offers a turnkey service for the creation of clothing products and the management of overseas or local clothing production. (FDG Design, n.d.-a)
	Short-term renting	Provide short-term rental services	1	Yes	They offer a trendy option that goes against the principles of fast fashion. A more responsible and concerned concept for a future that does not go out of style. (Maison LPRN, n.d.)
Extend the life of product and components	Maintenance and repair	Provide (lifetime) warranty with (free) repairs and touchups of garments, storage and cleaning services	18	Yes	Ça va bain knitwear Spa: a personalized washing, refurbishing, and repair service for ça va de soi knits (ça va de soi, n.d.)
	Refurbishing	Implement end-of-life collection programs with the intent of recycling/refurbishing and second-hand retail	9	Yes	At Audvik we have the planet and eco-responsibility at heart, that's why we created our second-hand program. The goal is simple, we offer our customers the opportunity to give their Audvik jackets a second life and to shop pre-loved and pre-owned jackets. (Audvik, n.d.)
	Donating and reselling	Donation of overstock or end-of-life collected garments	6	Yes	Our Second Life program encourages our clients to return their used Kanuk coat to us so we can donate it to those in need, and they can collect a discount on their next coat. See, we happen to think that the only thing better than recycled, is never thrown away in the first place. (Kanuk, n.d.)

Objectives	Strategies	Observed practices	Number of brands (n=90)	In the literature (Y/N)	Exemplar brand offering
Extend the life of product and components *(continued)*	Donating and reselling *(continued)*	Provide platform for resale of clothing and accessories (e.g., consignment stores)	1	Yes	We are committed to offering pre-loved gems while contributing to the circular economy. Our collections are carefully curated, authentic and luxurious. (Retyche, n.d.)
	Functional economy	***Note: Practice to operationalise this circularity strategy not found in Montreal***	0	Yes	
Give resources a new life	Industrial ecology	Repurposing and upcycling deadstock and waste materials *(from other brands)*	28	Yes	The majority of the fabrics that we source are produced in Canada, eco-certified, or deadstock. Deadstock is typically limited edition as they are sourced in low quantity. (Em & May, n.d.)
		Partnerships with brands and organisations for resale or donation of leftover materials	10	No	In the mission to reduce our ecological footprint, we must not neglect the management of our production waste. In addition to optimizing the use of our fabric by making small accessories, the scraps of our garments are donated to manufacturing companies or to students. (Gabryelle, n.d.)
	Recycling and composting	Use of recycled fibres (e.g., material from discarded industrial or ocean waste, PET bottles etc.)	35	Yes	Made entirely from plastic waste found in the sea, the Econyl® fabric is a good choice for the production of our swimsuits. The good thing is that these fabrics are infinitely recyclable without any quality loss, which reinforce our circular manufacturing process. (Mimi & August, n.d.)
		Use of minimal, recycled, reusable, and compostable packaging	25	Yes	All orders are shipped using eco-friendly EcoEnclose packaging. All polymailers used are made from 100% recycled content, are biodegradable, and recyclable. All clear bags are made from 100% recycled content and are recyclable. Please, re-use if you can! (Valérie Dumaine, n.d.)
	Energy recovery	***Note: Practice to operationalise this circularity strategy not found in Montreal***	0	Yes	

Understanding Montreal as a backdrop to the sustainable fashion industry

In addition to exploring the circularity strategies and practices employed by sustainable fashion brands in Montreal, interviews with key informants provided insights into contextual considerations that impact the transition to a circular economy. In addition to access to skilled labour and raw materials (discussed in the previous sections), interviewees emphasised local culture and community, industrial and supply chain network, and support from the government as important external factors for sustainable fashion brands. Other factors include support from other organisations and overhead costs in Montreal (see Table 4 for a summary of findings for contextual factors identified by interviewees).

Local culture and community

When asked about why they chose to situate their business in Montreal, 8 out of 12 interviewees appreciate the vibrance of Montreal and the "high cultural value" it possesses as a North American city with European influence, and a unique legacy of fashion (Eliza Faulkner, January 2023; Frank And Oak, April 2023). As one interviewee points out, there is a sense of "savoire-faire", that is, the know-how that is not present in other Canadian cities; she explains that "Montreal is so artistic and has this European feel to it, like the American dream with the European culture, so automatically you have that [know-how]" (Elisa C-Rossow, June 2023). Interviewees also emphasise the collaborative community of local designers and creatives, as an important consideration to why they chose to build their business in Montreal (Odeyalo, March 2023; Créations Gama, February 2023). The rich cultural pride, coupled with the burgeoning creative and design community, provides a conducive backdrop for sustainable fashion brands to root in Montreal.

Industrial and supply chain network

While possibly not as large as its historical presence, the garment district in Chabanel is still home to fabric mills, suppliers, and garment workers possessing technical skills including pattern making, cutting, grading, and sewing. When asked why the brand was set up in Montreal, the interviewee from Eliza Faulkner Design identified proximity to key industrial actors as a major contributing factor. These include fabric manufacturers, component suppliers, and creatives, including stylists, photographers, and models (Eliza Faulkner Design, January 2023).

However, despite the recognition of an established industrial network in Montreal, an interviewee also raised critical concerns regarding the lack of vision, leadership direction, collaboration, and financial investment that will likely result in the decline of the fashion industry in Quebec (Maison Marie Saint Pierre, April 2023).

Support from the government

Of the 12 interviewees, 8 agreed on the positive support provided by the Quebec government in terms of financial and educational assistance. Interviewees from Eliza Faulkner Design, Odeyalo, and Jennifer Glasgow Designs have pointed out that Montreal is an advantageous place to start and grow a small business in the art and culture space, with the grants and subsidies, lines of credit, and business development support provided by the government of Quebec, Ville de Montreal, and institutions such as SODEC Quebec[9].

However, 7 interviewees have also noted where the governmental support falls short for sustainable fashion brands. This is mainly in terms of high tax rates, unfavourable import regulations, i.e., customs and duties, that result in costly procurement of sustainable textile from overseas, and redirection of investment towards other industries away from manufacturing. Specifically, in terms of transition to a circular economy, an interviewee has also stressed on the lack of government regulation to support sustainable production. She explains that, at present, the government only penalises brands that burn clothing, however, they are not taxing companies that are overproducing and contributing to unsold stocks in the first place, claiming that the government is "trying to solve the problem the other way around" (Elisa C-Rossow, June 2023). Another interviewee has advocated for government regulation to augment individual brand efforts to ensure responsible production, and hasten the transition to a circular economic model (Hernest Project, June 2023).

The interviewees provided nuanced insights into the support of the government, or lack thereof, for the implementation of circularity strategies and practices within the fashion industry of Montreal.

[9] SODEC Quebec: https://sodec.gouv.qc.ca/a-propos/la-sodec-en-bref/mission-vision-valeurs/

Table 4. Contextual factors that influence the sustainable fashion industry in Montreal

Contextual factor	Type of factor	Description and example(s)	Number of interviewees (n=12)	Representative quotes
Local culture and community	Enabler	• Cultural value and pride • Legacy of fashion • Collaborative community of artists and creatives	8	"I have heard when going to Toronto for markets...you guys from Montreal are such a tight community and we have never seen this, and people in Toronto have more of that vision, they envy it. I don't think that exists in other places, so Montreal is great for the community." (Odeyalo, March 2023) "In this building, there are maybe 20 other furriers like me, but we work together, we help each other. I do the leather for them, and I ask them to do some work on the fur. So, it is like a collaborative community." (Créations Gama, February 2023)
Industry and supply chain network	Enabler	Strong industrial network: • Close proximity with key industry actors in Chabanel	9	"That's why we're based up in the Chabanel district, because we are next to fabric suppliers, button suppliers, other suppliers. We can get all over trims made kind of around the corner, which doesn't exist in a lot of other cities ... so there's the manufacturing side, the producers, and then there's also the marketing side which are creative. So, there [are] stylists, models, photographers, there's kind of an endless, almost a surplus of it in Montreal, whereas in other cities there would be a shortage." (Eliza Faulkner Design, January 2023)
	Barrier	Weak industrial network: • Lack of collaboration amongst designers and brands	3	"There's no vision for the future ... Most people in Quebec had to work hard to achieve success, and I agree with that. But what is taking them so long to help other generations to do better than them? ... I think we are lacking leadership from major players that were very successful in making money, because that is all that matters. They all produce elsewhere, so what is their contribution to the local economy?" (Maison Marie Saint Pierre, April 2023)
Access to skilled workforce	Enabler	Technical expertise: • Craftsmanship and technical know-how	4	"There are a lot of artisans in Montreal... the artisanal city of Canada, so I think it makes sense that we, designers or artists can shine a bit more here." (Elisa C-Rossow, June 2023)

Contextual factor	Type of factor	Description and example(s)	Number of interviewees (n=12)	Representative quotes
Access to skilled workforce *(continued)*	Barrier	Decline in technical expertise: • Aging workforce • Economic and industrial environment • Disconnect between education and industry demands	6	"There is no more people to do the [work], there is no more men d'œuvre [worker], and if there is, they are like 65 [years old], so they're gonna retire ... but the problem is we're not gonna have anyone to replace them." (Elisa C-Rossow, June 2023) "No, they [the younger generation] don't want to do that. They all want to be fashion designers. So, like we all say, on the board of MMode...we don't need more fashion designers, we need like technical skills and engineers." (Marigold, March 2023)
Access to raw materials	Enabler	Good access: • Deadstock and waste materials from the industry • Common pre-sales of textile	6	The majority of our fabrics are deadstock — meaning remnants from larger companies and fabric mills sold through a dealer. (Hannah Isolde — website) "There's this company called Montloup, and they're doing like, pre-sales of fabric. Like it's common sales, so everyone can go and purchase a little bit of something so they have a big quantity enough to produce it." (Odeyalo, March 2023)
	Barrier	Limited access: • Lack of local production of sustainable raw materials • Minimum order quantities • High import cost i.e., customs and duties	7	"Some of the fabric suppliers I have still have minimums. So, that is often why I am stuck with a lot of stock at the end of the day because you have to buy X amount of meters. I guess I'll just buy them, I have no other choice." (Hannah Isolde, February 2023) "As a Canadian, bringing stuff into Canada, for textiles or anything, it's so expensive." (Jennifer Glasgow Designs, May 2023)
Support from government	Enabler	Favourable government support: • Financial support – grants and subsidies • Educational support	8	"I can definitely say that the Canadian and the Quebec government have way more support than most places. We did, for example, get a grant last year...for our launch in China. I think one of the reasons we got that grant was that we were demonstrating [and] exporting Canadian values of sustainable and clean living. I know that there are definitely government grants and initiatives to help with ESG frameworks and assessments." (Frank And Oak, April 2023)

Contextual factor	Type of factor	Description and example(s)	Number of interviewees (n=12)	Representative quotes
Support from government *(continued)*	Barrier	Unfavourable government support: • High taxation rate • Unfavourable import regulation i.e., customs and duties • Lack of investment in manufacturing sector	7	"They [government] want to tax the company that actually burns clothing. Fine, whatever. But the problem is not that. The problem is the opposite end of the spectrum— a company produces 100,000 pieces of clothing that year and they actually sell only 20,000 of those pieces, you have to regulate them and say next year, you can't produce more than 30k, that's it. You're trying to solve the problem the other way around?! So, for me, government should be working way more on these kinds of things because it's the problem of everyone when a pile of clothing is being thrown or being burned." (Elisa C-Rossow, June 2023) "It's too bad that it [movement towards sustainability] can't be government-led right now. It's people and brand-led, which it shouldn't be. We shouldn't have to be asking the government for proper recycling of clothing, that just seems crazy. Or regulation of the industry in terms of what it does with the off-cuts, and all of the waste from dyeing ... all of that should be government regulated and I feel like it would go much faster." (Hernest Project, June 2023).
Support from other organisations	Enabler	Positive support: • Lobbying • Visibility and recognition • Business development support	5	"Now I have a bit more visibility with MMode ... I want to get my voice heard for my industry." (Créations Gama, February 2023) "There's MMode who work, I think they work really hard for us to convince people that it's better to buy local." (Créations Gama, February 2023)
	Barrier	Insufficient support: • Lack of investment and funding	2	"Whether you are talking about any of the big institutions, financial institutions, even in Canada, they don't care about manufacturing." (Maison Marie Saint Pierre, April 2023)
Overhead costs	Enabler	Cost of living: • Affordable rent and utilities	4	"The living costs here are easy to build something too. Like you can really survive. You can live a good life and you can be an artist." (Mercy House Studio, February 2023).

Discussion

This research contributes to existing CE literature by identifying industry-specific sustainability practices employed by brands to operationalise CE strategies within the context of Montreal's fashion sector. It also advances understanding by presenting potential explanation for the adoption and prevalence of CE orientations and strategies employed by firms in Montreal's sustainable fashion industry. Further, findings from this study provide insights into contextual factors that enable or create barriers for implementation of circularity strategies and the transition of the industry towards a CE.

Extant literature for CE implementation within the fashion sector has mainly focused on the consumption and disposal phases of the product lifecycle (e.g., Henninger et al., 2019; Machado et al., 2019; Pedersen et al., 2019), with researchers pointing out that the earlier stages of resource extraction and product manufacturing have been left largely underexplored (Brydges, 2021; Rosa et al., 2019). Interestingly, this study found that most brands within the sustainable fashion industry in Montreal are adopting circularity strategies that collectively rethink the extraction and use of resources in the earlier stages of the product lifecycle, including design, procurement, operations improvement, and consumption. This focus is also apparent in the number of practices (26 of 37) being employed by brands in Montreal to operationalise these *rethinking* strategies. Comparatively, fewer brands are employing a mix of strategies to optimise the use of extracted resources in the latter phase of the clothing lifecycle, including recycling, repurposing, repairing, and refurbishing. Only 11 of the 37 circularity practices identified in this study are being employed by sustainable brands to operationalise these *optimisation* strategies.

Rethinking the fashion industry in Montreal

With the objective of reducing the consumption of resources and preserving the natural environment, Montreal-based sustainable brands have reformed the initial phases of clothing lifecycle and implemented numerous practices to operationalise circularity strategies, including ecodesign, responsible procurement, operations improvement, and responsible consumption.

The sustainability literature has assigned significant importance to the design stage of a product lifecycle, as it accounts for environmental impacts throughout the useful life of a product, influences circularity decisions in consequent phases, and determines the overall level

of product sustainability (Ghisellini et al., 2016; Niinimäki & Hassi, 2011; Ramani et al., 2010). Product ecodesign has been identified as the cornerstone of CE objectives, aimed at multiple, useful product and component lifecycles to reduce pressure on virgin raw material consumption, while effectively maintaining quality and performance standards (Franco, 2017; Lieder & Rashid, 2016). Accordingly, this research has uncovered major focus on product design, with 70% of sustainable fashion brands in Montreal ensuring quality and durability, timelessness and multi-functionality, and recyclability. Study participants highlighted how high quality and durable clothing results in prolonged use that limits environmental externalities from product overconsumption and creates economic value for customers by reducing cost per wear. This is, therefore, aligned with the envisioned environmental and economic viability of CE directives (i.e., products need to be designed for physical and emotional durability, and end-of-life reuse for environmental and economic advantage) (Ellen MacArthur Foundation, 2021).

Researchers have also emphasised that for market proliferation of sustainable textile, they must, in addition to yielding ecological benefit, be able to compete with 'non-green' counterparts in terms of functionality and aesthetics to influence consumer purchase intent and behaviour (Dangelico & Pujari, 2010; Kim & Ko, 2010; Pujari, 2006). However, Franco has noted that few materials and apparel products have been developed and marketed that "deliver desired performance and appearance benefits at a reduced environmental cost" (2017, p. 839). On the contrary, this study shows that sustainable brands in Montreal are going beyond the reputation of being "granola", and producing well-conceived, high-performance clothing with superior aesthetic value that can prove to be true alternatives to trendy fast fashion pieces. Moreover, through timeless styles and multi-functional design, as prescribed by Gwilt (2015), these brands ensure product longevity and continue to combat the pressures of hectic consumption and seasonal, trendy, throwaway fashion.

While designing for recyclability is an established practice in the CE, its prevalence within the fashion sector is restricted, at present, as seen in the complexity of materials and components (Novak & Eppinger, 2002) and product architecture (Franco, 2017; Henderson & Clark, 1990) of clothing. The lack of implementation for this practice has primarily been attributed to the limited availability of green alternatives for materials and components (Rizos et al., 2016), and processing technologies (Pal & Gander, 2018). Relatedly, this study finds that this ecodesign practice is only being implemented by one brand in Montreal— Frank And Oak— that

eliminates the use of non-recyclable hardware and the use of mono- and bi-fibres to facilitate recycling at product end-of-life. The interviewee also reiterates the infancy of recycling technology within the textile space, that poses a barrier to recoverability at disposal.

In terms of establishing responsibility in the procurement practices, the CE has been criticized for its narrow focus on the environment, and discounting the social impact, within the supply chain (Ashby et al., 2012; Carter & Liane Easton, 2011). Increasingly, researchers have emphasised the need for concurrent focus on environmental and social aspects, with responsibility and accountability ascribed to relevant stakeholders within the fashion supply chain (C. M. Armstrong et al., 2015; Kozlowski et al., 2012; Shen, 2014). This holds especially true for global fashion value chains with farming and manufacturing facilities in developing countries with weak regulatory frameworks (De Brito et al., 2008). Interestingly, this research has found that close to 80% sustainable fashion brands studied have a focus on ensuring the social well-being of employees, including the implementation of responsible labour practices, such as living wages and equity, fair working hours, secure working conditions, and other social benefits, throughout the supply chain— in-house or outsourced. In line with academic propositions (see Krause et al., 2009; Macchion et al., 2018), brands have also emphasised the assessment, selection, and management of supply chain partners that mirror the focal brands' values of social and environmental sustainability.

On the environmental dimension, sustainable sourcing practices within the supply chain have been actively investigated, including procurement of green or eco-friendly materials (Allwood et al., 2008; Krause et al., 2009). This study also highlights the focus on procurement of natural, ecological, biodegradable, low-impact, and ethically sourced raw materials. Through the use of organic fibres that prevent landfill buildup and water pollution, low-impact fibres that consume considerably less water and are grown without chemicals, and certified vegan and cruelty-free materials, brands are committing to the preservation of ecosystems. Although driving the demand for sustainable raw materials, conscious brands in Montreal have identified contextual barriers to the widespread implementation of this circularity practice. These challenges include design implications associated with the use of natural fabrics, high prices for sustainable materials compared to virgin or 'brown' alternatives (see Kirchherr et al., 2018), limited local access to new, sustainable materials, minimum order quantities determined by local suppliers, unfavourable import regulation that increases cost, and lack of transparency within the

fashion supply chain that deters sustainable procurement. This opens up opportunities for regulatory reform, i.e., protective laws that prevent dumping of ultra-cheap, low-quality material and clothing, from other countries in the Canadian market, favourable import duties and taxes to improve access to sustainable raw materials, and targeted governmental support for local production and supply of sustainable primary materials.

At the manufacturing stage, close to 80% of sustainable clothing brands studied implement practices to reduce resource consumption, including small-scale and demand-driven production, local procurement and manufacture, reclamation of textile waste, and use of clean technology. As prescribed by previous research, by employing small, demand-driven, and made-to-order batch runs, brands in Montreal are eliminating the risk of unsold inventory, textile waste, and negative environmental externalities associated with overproduction (see Mustonen et al., 2013; Pal, 2014; Pal & Gander, 2018). The local government can support this circularity practice by not only penalising organisations that dump or burn unsold clothing inventories, but also by placing restrictions on production quantity to prevent stockpiles, in the first place. However, interviewees in this study have highlighted that, in reality, this small-scale, demand-driven production model can prove challenging, in terms of operations and revenue generation, due to long production lead times and little upfront inventory to immediately ship from.

In efforts of streamlining operations, sustainable brands in Montreal have also been found focusing on local procurement and manufacturing to minimise carbon emissions from transportation and logistics, as well as enabling greater quality control and organisational responsiveness, to minimise clothing waste. As pointed out by interviewees, the implementation of this circularity practice in Montreal may be attributed to the prevalence of the local garment industry in the Chabanel District that provides ready access to raw materials, equipment, and manufacturing expertise, and supports the industry's transition to the CE. This practice is also of importance due to one of Quebec Circulaire's prime objectives— employment creation and local economic development (Québec Circulaire, n.d.-b).

Comparatively, few sustainable clothing brands are undertaking efforts to minimise textile waste by reclaiming off-cuts from the production process and refashioning them into items such as quilted jackets, hats, tote bags, and scrunchies. While this practice addresses an important sustainability challenge by using fewer virgin resources (Pigosso et al., 2010), interviewees have stressed that repurposing manufacturing scraps is an expensive and time-

consuming circularity practice, requiring significant creative effort and dedicated manpower. Prior literature, while acknowledging this challenging aspect of implementation, has also discussed how this labour-intensive process of craftsmanship and redesign opens up opportunities of local job creation (European Environment Agency, 2016; Gray & Charter, 2007).

Although clean production has been regarded as an essential strategy for CE and sustainable development (Bilitewsky, 2012; Li et al., 2010), less than 25% of studied brands are adopting clean technology within the supply chain to reduce resource consumption and minimise environmental damage. This study found that brands are employing low-impact and efficient manufacturing processes to lower water and energy consumption (e.g., Frank And Oak's Hydro-less technology; see also Papahristou & Bilalis, 2017), ensuring reduction in the usage of toxic chemicals within the supply chain (e.g., sourcing fabrics with natural dyes), and utilising renewable resources to reduce carbon emissions within the value chain (e.g., Gildan's use of biomass as a low carbon alternative; see also Subic et al., 2013). However, the limited adoption of this circularity practice could be explained by the hefty investment in technology, value alignment with supply chain partners, and the size and influence of the brand within the supply chain that determines overall implementation (Ellen MacArthur Foundation, 2017; Franco, 2017; Kirchherr et al., 2018). While many interviewees have openly cited technological investment as a financial barrier, the latter is more implicitly evident in that 9 out of 13 brands employing clean technology within manufacturing are SMEs, and only one company— Gildan, a publicly listed sustainable apparel brand— employs the use of renewable energy sources within its value chain. In line with prior recommendations (Ranta et al., 2018; Rizos et al., 2016) and practical success within the EU (Hodge et al., 2015), we suggest that access to financial sources be established for the apparel manufacturing industry, either via public subsidies and support or private equity investment, to ensure economic viability of circularity initiatives.

Pal and Gander have identified the “institutionalized nature of practices of fashion apparel design and assembly” as an obstacle for the adoption of disruptive clean technology and processes (2018, p. 257). Even in the European Union, a frontrunner in CE conversation and implementation, ‘conservative’ supply chains have been cited as a major barrier, indicating that a company’s commitment to circularity does not translate to active implementation if partners within the supply chain also do not adhere to it (Kirchherr et al., 2018; Witjes & Lozano, 2016).

Interviewees in this study have echoed that demanding and initiating supply chain reform towards transparency and sustainability is a challenge within such an established system wherein traditional industry values and operational practices are so 'ingrained'.

Sustainability and CE literature have consistently emphasised customer responsibility in the reduction of overall consumption and boosting the use of sustainable products (Ghisellini et al., 2016; Su et al., 2013), and have identified initiatives to motivate responsible consumption behaviour, e.g, information and education-oriented tools such as labels and advertisement campaigns (Jurgilevich et al., 2016; Rizos et al., 2017). Some researchers have extended this responsibility to all relevant stakeholders for effective transition to the CE, that is, if a product cannot be reused or recycled at the end of its useful life, manufacturers should not produce it and customers should refrain from purchasing it (Ghisellini et al., 2016). In line with this, close to 50% of sustainable brands in Montreal are operationalising the CE strategy of responsible consumption by establishing product attachment, providing transparent information to customers, and employing anti-consumerist marketing efforts.

By delivering curated, customised, made-to-order clothing, and services, brands in Montreal are re-establishing the value of clothing that has been lost over time to fast fashion, and increasing product retention. Prior literature has asserted that product customisation actively engages customers in the manufacture process, enhances emotional durability, and results in sustainable consumption behaviour that negates premature clothing obsolescence (Dissanayake, 2020; Piller & Müller, 2004).

In terms of transparency, close to 40% of brands provide proof of material traceability through third-party certifications, such as OEKO-TEX, GOTS, and RDS, which is essential information for end-of-life recycling (see also Lieder & Rashid, 2016). However, very few brands in Montreal are actively establishing transparency in terms of pricing and other circularity initiatives. Price transparency is especially of importance to create consumer awareness for and justify the higher costs associated with sustainable offerings, including cost of high quality, responsibly sourced raw materials and living wages for garment workers. Of the brands studied in Montreal, Marigold has initiated the use of transparent pricing labels that detail the costs of materials, production, R&D, salaries, marketing, and packaging. The interviewee confirmed that the implementation of this CE practice would be more widespread in the industry if sustainable brands made the requisite investment in terms of time and effort. In line with recommendations

from previous research (see Bocken & Short, 2016; Rizos et al., 2017), a few brands have also been found actively employing marketing practices to encourage conscious consumption of new clothing items, promote vintage shopping and swapping, and encourage focus on quality over quantity. Interviewees have stressed the importance of investing in product transparency and consumer education so that growing customer intention towards sustainability can effectively be translated into willingness to pay.

Optimising the fashion industry in Montreal

To optimise the use of extracted resources, Montreal-based sustainable brands have implemented numerous practices in the later stages of the clothing lifecycle, to operationalise CE strategies of collaborative economy, renting, maintenance and repair, donations and resale, refurbishment, industrial ecology, and recycling.

With over 60% of sustainable brands adopting principles of collaborative economy, our findings mainly highlight circularity practices at the producer level, in contrast with CE literature that generally focuses on peer-to-peer sharing at the customer level to intensify utilisation of products and services (see Armstrong et al., 2016; Pedersen & Netter, 2015). At the producer level, sustainable brands in Montreal operationalise this strategy through the collaborative use of human and infrastructural resources within local brand communities, for social and economic value creation (see also Balanay & Halog, 2016). The historical presence of a garment industry in Montreal provides brands with access to the artisanal culture, technical expertise, infrastructural resources, and supply chain networks to facilitate manufacture of sustainable clothing. While brands have acknowledged the collaborative spirit amongst designers and other industrial players in supporting sustainable apparel production, there is also rising concern for declining expertise and workforce within the region. Contributing factors for the latter include aging labour force, challenging economic and industrial conditions, insufficient government support, and the disconnect between educational curricula and industry requirements. In order to preserve and champion the local circular economy, brands have reported the collaborative use of manufacturing infrastructure, supplier networks, and human resources to mitigate barriers to the CE transition.

The established industry network in Chabanel also presents as an opportunity for Montreal-based sustainable brands to adopt industrial ecology as a CE strategy for mutually beneficial resource exchange. Approximately 30% of brands procure deadstock, waste materials

and by-products from other brands to repurpose into their own manufacturing, and another 11% partner with other companies to effectively manage their own post-manufacturing scraps and leftover materials. However, in line with the conclusions of Guide and Van Wassenhove (2009), this study presents considerations for the use of deadstock materials including quality and integrity, adequate quantity, and alignment of sourced by-products with the design requirements. Dissanayake and Sinha (2015) have also pointed out that the sheer variety of collected waste fabrics prevents standardisation in the production processes and outputs, further emphasising the need for product traceability and transparent labelling. Despite these challenges, industrial symbiosis results in economically profitable resource exchange (Heeres et al., 2004), minimising overall textile waste, reducing pressure on primary resources (Rizos et al., 2017), and lowering carbon emissions by enabling local sourcing and manufacturing.

While repair and refurbishing remain popular strategies within CE literature to extend the life of the product and its components (see Franco, 2017; Ghisellini et al., 2016), they are operationalised by less than 30% of studied brands in Montreal. Designers recognise the merits of providing warranties and maintenance services, establishing takeback schemes, recycling or restoring, and reselling collected clothing items, however, the implementation in Montreal's sustainable fashion space is limited. Findings from this study suggest that the lack of organisational capacity and scale of sustainable micro-brands deem the adoption of these circularity strategies uneconomical and unviable in the long run. This study also highlights an important consideration for the widespread implementation of these circularity practices— the customer. Especially in the realm of fashion, a cultural shift is required from constantly acquiring new clothes (Ranta et al., 2018) to actively returning items to brands instead of disposal (Repo & Antonnen, 2017), and engaging in repair and restoration of clothing, as pointed out by interviewees.

Finally, at the end-of-life phase, almost half of the sustainable brands in Montreal have been found to implement the recycling and composting strategy to replace the use of virgin materials in the product and packaging. For the product line, brands are using recycled materials such as cotton, wool, nylon, and polyester, and other innovative materials such as Econyl® from regenerated fishnets, discarded industrial waste such as airline seats and seatbelts (Bedi Studios, n.d.-a), and Seawool® from recycled polyester and oyster shells (Frank And Oak, n.d.-c). The use of recycled materials has the potential to mitigate price volatility of primary raw materials

and high import costs (World Economic Forum, 2014)— concerns that Montreal-based sustainable brands have also reported. However, in terms of technology, recycling is largely applicable for mono-materials of natural (e.g., cotton) or synthetic (e.g., polyester) fabrics, and fairly limited for blended fabrics (e.g., cotton and nylon), since separation technology is in its developmental stage and fairly expensive to scale (Pal & Gander, 2018; Palm et al., 2014). Although blended fabrics are known to facilitate durability and breathability of fabrics, the lack of technology to accurately determine fabric composition, prevents large-scale recycling (Franco, 2017). With this consideration, Frank And Oak, as discussed earlier in this chapter, has ramped up the use of mono- and bi-fibres, and eliminated non-recyclable hardware in its clothing production for maximum end-of-life recoverability.

Conclusion

While the CE gains traction globally, and is endorsed by the Government of Quebec for local implementation, it is important to note that the transition to a CE model is a systemic change requiring necessary alterations to the production and consumption status quo. This case study, examining the operations of 90 sustainable brands in one of the largest (and most polluting) industries of Montreal (Pal & Gander, 2018; United Nations Alliance for Sustainable Fashion, n.d.), provides insight into the current state, aspirations, challenges, and potential way forward for this sector. This research into the local sustainable fashion landscape has advanced understanding of circularity orientations, strategies, and practices that brands are employing, and the contextual factors that present as enablers or barriers for the transition of the industry to a circular economic model.

First, we find that the local industry's focus on rethinking the earlier stages of product development and manufacturing, in fact, is more favourable for the transition to a CE model than a conventional concentration on the later stages of product lifecycle, i.e., post-disposal recycling and reclamation. In doing so, this study presents a holistic view of circularity strategies and practices, and associated considerations and challenges, across the clothing lifecycle. Second, through insights from 12 interviews conducted with key informants within the sustainable fashion industry, we identify Montreal-specific factors that enable and/or impede the transition to a CE model, including local culture and design community, industry and supply chain network, access to skilled labour, access to sustainable raw materials, support from the government, support from non-governmental organisations, and overhead costs.

Based on these findings, we highlight certain managerial and policy considerations for widespread implementation of strategies to optimise resource utilisation, reduce environmental damage, and increase gross domestic product, in line with the objectives of Québec Circulaire. Foremost, for the transition to a CE model, it is imperative for brands in Montreal's fashion industry to rethink existing business models to reflect circularity as a core value, and support the implementation of sustainable strategies from garment ideation to consumption. The 90 women's apparel brands included in this research study provide proof of concept for economically viable, sustainable product offerings that contribute to the province's circularity mandate. Second, it is necessary for brands to increase investment in clean technology that streamlines design, production, and post-consumption processing of clothing, for minimal environmental detriment. Third, brands must adhere to fair labour practices to attract, retain, and encourage the development of skilled workforce to enable sustainable clothing production with high quality and aesthetic value. Fourth, brands must engage with industry partners to develop a supply chain infrastructure that supports circularity strategies, e.g., traceable procurement of sustainable raw materials, and reverse logistics mechanisms for efficient recycling and reclamation of returned clothing. Lastly, to successfully transition to the CE, there is a need for brands to incite a cultural shift towards responsible apparel consumption, e.g., through social media that has the potential to reach a wider customer base, organically and without the financial pressure of conventional marketing campaigns.

While sustainable brands in the Montreal's fashion industry greatly benefit from governmental assistance in terms of financial grants and subsidies, business development support, and lower cost of operations, this study has emphasised the importance of certain other policies to further industry circularity. These include the implementation of favourable import regulations for increased access to affordable sustainable resources, protective laws to disincentivize the purchase of virgin resources and penalise unsustainable clothing production, financial incentives for sustainable brands, and training and skill development programs to preserve and promote local artisanship.

This research study has several limitations, that provide potential avenues for future research. First, our sample size for interviews is limited, thus warranting caution for external validity. Future studies with a larger interview sample would prove beneficial in solidifying some of the insights generated by our research, and possibly identify additional factors for

consideration in the local industrial and regulatory context. Second, this research presents a very industry-specific analysis of CE orientations, strategies, practices, and contextual factors, which is not representative of other sectors. The replication of this study in other industries would prove valuable in gauging the implementation of Quebec Circulaire's circularity mandate. This could then help refine the QC analytical framework and provide insights for suitable government intervention to hasten the province's transition to a circular economy.

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Appendix A

List of sustainable fashion brands included in the research sample

Brand name	Brand name	Brand name	Brand name
Albéric Studio	FDG Designs	Maison LPRN	Oraki
Alex Watson	FIG	Maison Marie Saint Pierre	Ovate
Amanda Moss	Frank and Oak	Marc Alexandrin	Quartz Co.
Andrea G Hand+Made	Gabryelle	Marigold	Rachel
Atelier B	Genia Evelina	Mary Young	Ramonalisa
Audvik	Gibou	Mas Montreal	Retyche
Bedi Studios	Gildan	Matt and Nat	Rightful Owner
Betina Lou	Gorski	Meemoza	Rose Buddha
Beurd	Hannah Isolde	Melow	Rosé Collection
C'est beau	Harricana	Mercedes Morin	Selfish Swimwear
ça va de soi	Hernest Project	Mercy House Studio	Shan
Cokluch	Jennifer Glasgow Design	Message Factory	SLT Studio
Creations GAMA	Josiane Perron	Mimi and August	Soia & Kyo
Daily Story	Judith and Charles	Moov Activewear	Stay Soft
Dorsali	Kanuk	Nemrac	Tristan
Elisa C-Rossow	Katrin Leblond Design	Nil Apparel	Ursa Minor
Eliza Faulkner	Kazak	Noble	Valerie C. Design
Em and May	Kuwalla Tee	Noemiah	Valérie Dumaine
Essentiels Co	La Canadienne	Noize	Veri
Esser Studio	Lafaille	Norden	Want Les Essentiels
Eve Gravel	Le Cartel	Odeyalo Clothing	Yoga Jeans
Eve Lavoie Designer	Lushyne	Olmsted Outerwear	
Evrday	Maison Elama	OOM Ethikwear	

Appendix B

Embedded case studies: List of sustainable brands and data sources

Name of organisation	Data sources	Date of access	Quantity
Créations Gama	Interview with Owner and Designer	22-Feb-23	1 hour
	Website	Mar-23	2 pages
Elisa C-Rossow	Interview with Owner and Designer	26-Jun-23	1 hour
	Website	Mar-23	9 pages
Eliza Faulkner	Interview with Chief Executive Officer	31-Jan-23	1 hour
	Website	Mar-23	1 page
	News and press	May-23	2 pages
Frank And Oak	Interview with Chief Brand Officer	21-Apr-23	1 hour
	Website	Mar-23	6 pages
	External document: Brand Progress Report	Jan-23	17 pages
	External document: Supplier Code of Conduct	Jan-23	5 pages
Hannah Isolde	Interview with Owner and Designer	15-Feb-23	1 hour
	Website	Apr-23	2 pages
Hernest Project	Interview with Owner and Designer	27-Jun-23	1 hour
	Website	Mar-23	6 pages
	External document: The 2030 Plan	Mar-23	11 pages
	External document: Supplier Code of Conduct	Mar-23	4 pages
Jennifer Glasgow Design	Interview with Owner and Designer	09-May-23	1 hour
	Website	Mar-23	2 pages
Maison Marie Saint Pierre	Interview with Owner and Designer	25-Apr-23	1 hour
	Website	Mar-23	3 pages
	Internal document: Sustainability	Apr-23	6 pages
Marigold	Interview with Owner and Designer	22-Mar-23	1 hour
	Website	Mar-23	2 pages
Mercy House Studio	Interview with Owner and Designer	06-Feb-23	1 hour
	Website	Mar-23	2 pages
Odeyalo	Interview with Owner and Designer	01-Mar-23	1 hour
	Website	Mar-23	5 pages
Valerie C. Design	Interview with Owner and Designer	16-Jun-23	1 hour
	Website	May-23	6 pages
	News and press	May-23	1 page

Appendix C

Consolidated data for sustainable fashion brands in the research sample

Please see attached supplemental file for data collected for the 90 sustainable fashion brands included in this research.

File name: Ahmed_MSc_S2024_Thesis Supplemental Material

Tab(s) name: Appendix C – Primary Data

Appendix C – Circularity Findings

Appendix D

Information and Consent Form

Study Title: Are all conscious clothing brands created equal? Understanding sustainable business models within the fashion industry of Montreal, Canada

Researcher: Faiqah Ahmed

Researcher's Contact Information:
Email: faiqah.ahmed@mail.concordia.ca
Phone: (438) 885-0301

Faculty Supervisor: Adriane MacDonald

Faculty Supervisor's Contact Information:
Email: adriane.macdonald@concordia.ca
Phone: (514) 848-2424 ext. 8742

Source of funding for the study: Not applicable

You are being invited to participate in the research study mentioned above. This form provides information about what participating would mean. Please read it carefully before deciding if you want to participate or not. If there is anything you do not understand, or if you want more information, please ask the researcher.

A. PURPOSE

The purpose of this research is to understand if the internal structure (e.g. values, size of business, and access to financial resources) and external environment (e.g. customer demand, industry network, and government policy) have an impact on the way strategies for sustainability are devised and implemented by a company.

Within the context of sustainable fashion within Montreal, this research will also analyse if brands employing different sustainability strategies have differential trajectories of impact and potential for growth and scalability.

B. PROCEDURES

If you participate, you will be asked to take part in a one-time interview in-person or virtually through video-conferencing applications such as Zoom. Please note that, if necessary, for clarification purposes only, I may request a short follow-up meeting.

In total, participating in this study will take approximately one-hour. **All interviews will be audio recorded.**

C. RISKS AND BENEFITS

This research is not intended to benefit you personally, rather it is to further understanding of support required for contributions to sustainability within the fashion realm, in terms of business model characteristics and drivers.

In case you feel uncomfortable for any reason during the interview, the researcher will stop the discussion and provide you with additional resources if needed.

D. CONFIDENTIALITY

I will gather the following information as part of this research: background information (such as your affiliation with and role within the organization), your experience of the company's journey, from ideation to conception and growth, including any challenges in its strides towards sustainability.

I will not allow anyone to access the information, except people directly involved in reviewing and assessing the research. The information will only be used for the purposes of the research described in this form.

The information gathered will be coded. That means that the information will be identified by a code. The researcher will have a list that links the code to your name.

I will protect the information by password protecting all original and copied digital materials. Additionally, any handwritten notes will be transcribed and digitally password protected. Once transcribed, the original handwritten notes will be destroyed.

I intend to publish the results of this research. Please indicate below whether you accept to be identified in the publications:

[ ] I accept that my name and the information I provide appear in publications of the results of the research.

[ ] Please do not publish my name as part of the results of the research.

I will destroy the information five years after the end of the study.

F. CONDITIONS OF PARTICIPATION

You do not have to participate in this research. It is purely your decision. If you do participate, you can stop at any time. You can also ask that the information you provided not be used, and your choice will be respected. If you decide that you don't want us to use your information, you must tell the researcher within one month of the date of the interview.

There are no negative consequences for not participating, stopping in the middle, or asking us not to use your information.

G. PARTICIPANT'S DECLARATION

I have read and understood this form. I have had the chance to ask questions and any questions have been answered. I agree to participate in this research under the conditions described.

NAME (please print) _____

SIGNATURE. _____

DATE. _____

If you have questions about the scientific or scholarly aspects of this research, please contact the researcher. Their contact information is on page 1. You may also contact their faculty supervisor.

If you have concerns about ethical issues in this research, please contact the Manager, Research Ethics, Concordia University, 514.848.2424 ex. 7481 or oor.ethics@concordia.ca.

Certification of Ethical Acceptability for Research Involving Human Subjects

CERTIFICATION OF ETHICAL ACCEPTABILITY FOR RESEARCH INVOLVING HUMAN SUBJECTS

Name of Applicant:	Faiqah Ahmed
Department:	John Molson School of Business\Management
Agency:	N/A
Title of Project:	Are all conscious clothing brands created equal? Understanding sustainable business models within the fashion industry of Montreal, Canada
Certification Number:	30017319

Valid From: November 03, 2022 To: November 02, 2023

The members of the University Human Research Ethics Committee have examined the application for a grant to support the above-named project, and consider the experimental procedures, as outlined by the applicant, to be acceptable on ethical grounds for research involving human subjects.

Dr. David Waddington, Chair, University Human Research Ethics Committee

Certification of Ethical Acceptability for Research Involving Human Subjects

(Post-amendment)

CERTIFICATION OF ETHICAL ACCEPTABILITY FOR RESEARCH INVOLVING HUMAN SUBJECTS

Name of Applicant:	Faiqah Ahmed
Department:	John Molson School of Business\Management
Agency:	N/A
Title of Project:	Are all conscious clothing brands created equal? Understanding sustainable business models within the fashion industry of Montreal, Canada
Certification Number:	30017319

Valid From: February 20, 2023 To: February 19, 2024

The members of the University Human Research Ethics Committee have examined the application for a grant to support the above-named project, and consider the experimental procedures, as outlined by the applicant, to be acceptable on ethical grounds for research involving human subjects.

Dr. David Waddington, Chair, University Human Research Ethics Committee

Appendix E

Organisational Approval Letter

To Whom It May Concern,

This is to confirm that we approve the participation of our organisation, [Name of organisation], in the research titled “Are all conscious clothing brands created equal? Understanding sustainable business models within the fashion industry of Montreal, Canada”. This research is being conducted by Faiqah Ahmed, under the supervision of Dr. Adriane MacDonald, at the John Molson School of Business, Concordia University.

The purpose of this research is to explore the business models of conscious clothing brands for women including, but not limited to, the influence of the internal structure and external environment on the sustainability strategies and initiatives employed by our brand. Key aspects of impact, challenges, and growth trajectories are also explored in this interview.

We authorize the use of information from this interview, and accept that the name of our organization appear in publication of the results of this research, including dissemination through presentations and journal articles.

Sincerely,

For [Name of organisation]

Appendix F

Interview Guide

The business context:

1. What is your brand origin story - the inspiration or drivers behind the development of your brand?
    a. Why did you choose sustainability as part of your brand vision, strategy, and/or product offering?
2. Why did you choose Montreal as your home base?
3. What is the fashion industry landscape in Montreal like, currently? Is there an evolving inclination towards sustainability amongst producers and retailers, and to what extent? Why?
4. Does the Montreal fashion community provide a viable target market that is receptive to sustainable fashion?

Existing operations:

1. In terms of sustainability, what is your brand's unique selling point?
2. What are the strategies and initiatives that you employ to achieve those?
3. How did you determine which sustainability strategies to incorporate in your business model and product offerings?
    a. Why did you choose the sustainability strategies that you did?
        - Internal factors – size, finance, organisational values, leadership vision
        - External factors – government support, supply network, market pressure
4. What is your target customer base and how does it respond to your sustainable and ethical commitments?
5. Is the business environment in Montreal conducive to your operational strategies, in terms of government support, product development, procurement and supplier networks and other networks?
6. Are there any challenges in your current business model and how do you mitigate them, if any?
    a. Procurement – sustainable raw materials
    b. Manufacturing – fair wages and labour conditions, zero waste production, energy efficient technologies, quality control
    c. Distribution – sustainable freighting and logistics, minimising carbon footprint, responsible packaging
    d. End-of-life program – upcycle, repair, reuse
    e. Revenue and profitability

7. In your opinion, how does your business contribute to Montreal's sustainable fashion ecosystem?
    a. What do you believe is your greatest positive social and/or environmental impact?
    b. Overall, how would you describe your impact within the industry and market?
    c. Would you be willing to share any statistics or information that can support your impact?

Potential business model evolution:

1. Where do you envision your business to position itself in the next 5 years?
2. Do you think you would want to scale your business model, in the coming years? In terms of, for example, geographical expansion, development of new product lines, and/or inclusion of other sustainability initiatives to your portfolio?
3. What do you anticipate the challenges to be for your company's growth, for example, competition from fast fashion brands, or lack of actionable consumer demand?
4. Do you believe that the sustainability strategies and logics that are the cornerstone of your business model can be replicated into mainstream fashion, to counter unsustainable apparel production?
5. Given your knowledge of the industry, how do you anticipate the fashion landscape to evolve, globally and in Montreal specifically?

Appendix G

Codebook for qualitative analysis

Please see attached supplemental file for the codebook used for qualitative analysis.

File name: Ahmed_MSc_S2024_Thesis Supplemental Material

Tab(s) name: Appendix G – Codebook