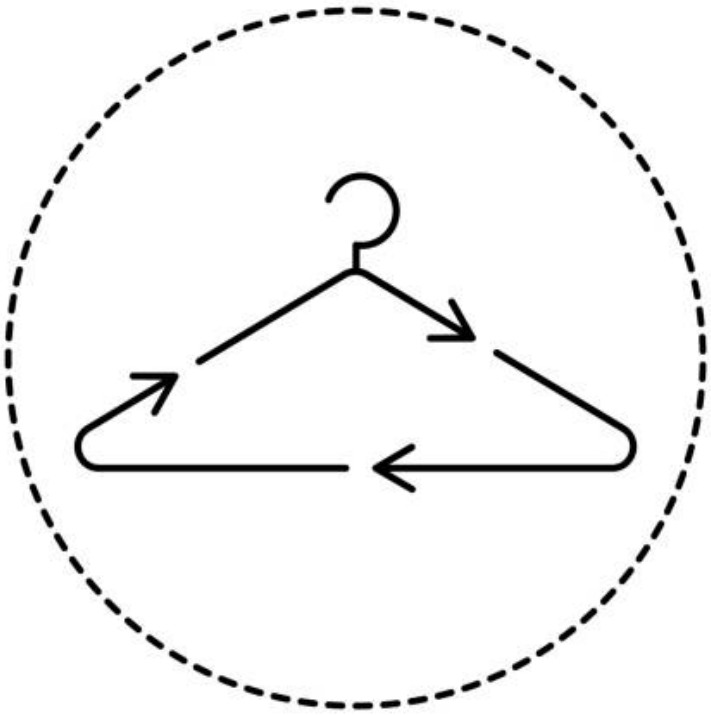
Clothing the Loop:
Exploring Start-ups and their Circular Business Model Innovations in the Fashion Industry



Written by My-Quyen Bui

This document is a Master Thesis for the completion of the M.Sc. Environment and Society Studies at the Radboud University of Nijmegen, The Netherlands

August 2022

Affidavit

Hereby, I declare that my master thesis entitled “Clothing the Loop - Circular Business Model Innovation in the Fashion Industry” is the result of my own research and effort. No other references and sources were used than those indicated. Quotations are properly marked. This work has not been presented as part of another examination process.

Nijmegen, 02 August 2022

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Thank you and enjoy reading!

My-Quyen Bui

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Abstract

The existing dominant unsustainable fashion system with a take-make-disposal principle calls for an urgent need for transformation. The desired fashion future is a new global textiles system aligned with the principles of a circular economy. A circular fashion economy is restorative and regenerative by design, provides benefits for business, society, and the environment, and reflects the true cost of materials and production processes in the price of products. In such a system clothes, textiles, and fibers are kept at their highest value during use, and after use, are circled back into the economy.

The key to progress is innovation, and there is a clear need for innovative business models within fashion in the pursuit of sustainability. Within the fashion industry, innovation and experimentation are manifold. At present, many of these interventions exist as small initiatives by start-ups outside of the linear paradigm. Although the relevance of start-ups for sustainable innovation and transitions is widely acknowledged, it is still open for discussion how start-ups grow and contribute to transitions. Therefore, this research investigates emerging issues, barriers, drivers, and opportunities that prevent and facilitate start-ups' upscale beyond their current niches and to reach the mainstream fashion market.

By combining the theory on business model innovation and the multi-level perspective framework, this research analyzes how the transition process in the development of a circular fashion regime via circular business model innovations by start-ups, is able to compete against the incumbent linear unsustainable fashion regime. The analysis considers the set of rules, actors and controversies that arise in the transition process. To conduct an in-depth exploration of this particular phenomenon, a multi-case study on five European start-ups with varying circular business models has been performed.

Keywords: Circular economy, Transition theory, start-ups, Business model innovation, Multi-level perspective, Fashion industry, Sustainability

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Chapter 1 - Introduction to the research

1.2 Background and context

The current economic system is heavily based on linear principles of extracting natural resources, using them up, and creating huge volumes of waste. Not only is this linear model unsustainable, the economic impacts of COVID-19 have shown how vulnerable we are to economic shocks resulting from any disruption in the current flow of resources (Amed et al., 2022; EllenMcArthur Foundation, 2020; Lisca et al., 2021; Pisani & Augier, 2021).

Textiles are an integral part of our daily lives and society, providing employment for hundreds of millions of people and creating tremendous economic value, but also hold personal value. However, long prior to the pandemic, the fashion industry had become subject to intense scrutiny for being exploitative, environmentally damaging (i.a. intensive farming, chemical dyeing), and unsustainable (i.a. extraction of virgin and non-renewable resources) (Buchel et al., 2022; Pisani & Augier, 2021). Stakeholders are increasingly worried about environmental issues, such as the impact of textile production and waste on climate change, as well as social issues, such as exploitative labor conditions for low-wage workers, especially in developing countries. In particular, fast fashion has led to an alarming increase in the quantity of cheap clothes produced under questionable conditions and waste (Cachon & Swinney, 2011; Chan et al., 2012). This situation is further aggravated by overproduction and -consumption which generate increased waste that is commonly sent to landfill, incineration or is disposed of in developing countries. Little effort is made in repairing, reusing and reselling unsold stock (Buchel et al., 2022).

Clearly, with the existing dominant neoclassical economic system with a take-make-disposal principle, the business models of fashion companies are not sustainable and calls for an urgent need for transformation. By moving towards a circular economy (CE) the current system can be restructured to one that prevents waste and pollution, keeps products and materials in use, and regenerates natural systems, leading to a more low carbon, resilient and prosperous economy (EllenMcArthur, 2020; Lisca et al., 2021).

In response to the detrimental impact of the fashion industry, numerous policies and guidelines have been formulated over the past years. The 2030 Agenda for Sustainable Development includes 17 Sustainable Development Goals which together present a holistic guide to achieve the simultaneous protection of both human rights and the natural environment. The goals relate to the fashion industry in many ways. In particular, goal 12 on responsible consumption and production is about “promoting resource and energy efficiency, sustainable infrastructure, and providing access to basic services, green and decent jobs and a better quality of life for all. Its implementation helps to achieve overall development plans, reduce future economic, environmental and social costs, strengthen economic

competitiveness and reduce poverty" (United Nations, n.d.), and thus, requires the fashion industry to integrate circular strategies.

On the European Union level, the adoption of the New Circular Economy Action Plan, as one of the building blocks of the policy initiative the European Green Deal, aims for a climate-neutral Europe by 2050 and highlights the essential need of the EU's economy to transition into a CE that "*gives back to the planet more than it takes, advancing towards keeping its resource consumption within planetary boundaries, and therefore strive to reduce its consumption footprint and double its circular material use rate*" (European Commission, 2020, p.4). As textiles are recognized as one of the key product value chains, the European Commission aims to enhance its market for sustainable and circular textiles through a comprehensive strategy that includes, inter alia, *"improving the business and regulatory environment for sustainable and circular textiles in the EU, in particular by providing incentives and support to product-as-service models, circular materials and production processes, and increasing transparency through international cooperation"* (European Commission, 2020, p. 13) and *"boosting the sorting, re-use and recycling of textiles"* (European Commission, 2020, p. 13).

For the fashion industry to align with global climate objectives and its own commitments on sustainable materials and production activities, action at business level is inevitable. With this in mind, companies must reinvent and innovate their existing business models for circularity. Here, the idea of business model innovation as a way to implement circular strategies on the organizational level is seen as key (Geissdoerfer et al., 2020; Nußholz, 2018), because it allows for a systemic change in the core architecture of a business and the alignment of incentives of stakeholders within the value network.

1.2 Problem statement

The fashion industry is embedded in complex, global value chains that remain largely linear. Considering the damaging environmental and social impacts the industry accounts for, the concept of CE has emerged as a potential strategy for developing business practices in response to sustainability concerns. To explain transition dynamics, existing research has been largely focusing on the role of technologies. However, it is commonly agreed that a systemic shift through technology alone will not be realizable, instead, more radical, non-technological innovation is needed to change the existing regime (Bidmon & Knab, 2018).

Linking to this issue, business model innovation is characterized by its holistic approach that concerns the entire internal core logic of a company (Hofmann & Jaeger-Erben, 2020; Pedersen et al., 2016). It cannot be reduced to, for example, just technological innovation. In recent years, broad consensus has emerged that business model innovation holds undeniable importance for transitioning toward a CE, and in general, for systemic change (Bidmon & Knab, 2018; Sarasini & Linder, 2018). Nevertheless, little is known about how business model innovation may act as a catalyst for systemwide sustainability

transitions, that is fundamental change at a societal level, and vice versa, how change at the societal level can contribute to the emergence of fundamentally different business models (Aagaard et al., 2021). In fact, both business model and transitions researchers recognize the other field's relevance in filling this knowledge gap and emphasize a deeper understanding on their interrelations (Bidmon & Knab, 2018).

This research specifically addresses the role of small, emerging firms, also called start-ups. It is widely agreed that they form the basis for economic growth. start-ups create both new jobs and boost competitiveness and innovation, and by that modernize the current economic structure (Horne & Fichter, 2022). To date, research on sustainable entrepreneurship and innovation has emphasized the start-ups' importance in multi-level transition as new entrants into markets. In their work, Hockerts & Wüstenhagen (2010) discuss that start-ups are more likely than incumbents to pursue sustainability-related opportunities and "kick off sustainability transformation" (Hockerts & Wüstenhagen, 2010, p. 488), thus, they are key players in introducing radical innovations. In addition, Geels et al. (2016) further emphasize the relevance of start-ups in different transition pathways within the framework of MLP. In the substitution pathway, existing technology is replaced by the introduction and scaling of radical innovations posed by start-ups. In the reconfiguration pathway, new and strong networks of incumbents and start-ups stimulate the transition process. Lastly, in the de- and re-alignment pathway, established firms collapse due to landscape pressure, thereby creating space and opportunities for start-ups to grow. Although the relevance of start-ups for sustainable innovation and transitions is widely acknowledged, it is still open for discussion how start-ups grow and contribute to transitions, including their social and environmental impacts (Horne & Fichter, 2022).

Focusing on the fashion industry and on "born green" entrepreneurial start-ups, empirical research remains scarce (Geissdoerfer et al., 2020; Bauwens et al., 2019). The majority of literature has looked at established companies that have gradually become more sustainable and circular, and the related barriers such existing companies experience (Ostermann et al., 2021). In addition, empirical research has been largely addressing the overall conceptualization of a CE itself, and barely that of circular business models and business model innovation (Geissdoerfer et al., 2020).

1.3 Research aim and questions

Given the shortcomings described in the previous chapter, the present research investigates to what extent and how companies and their sustainable, circular business model innovations contribute to the dynamic regime-level transformation towards sustainability and circularity. By incorporating multiple cases, a deeper understanding of different perspectives on current circular business practices, understandings of the concept of CE and other related sustainability concepts, and perceived pressures and facilitators of implementing and exercising circular strategies, from representative stakeholders in the fashion industry is gained. Furthermore, with the findings of this research, recommendations for

start-ups on how they can both efficiently and effectively contribute to the overall creation of a circular fashion future can be formulated. Thus, this study offers practical guidance as well. Based on these aims, the following research question will be investigated:

Which factors prevent and facilitate the upscale of circular-oriented start-ups to the dominant fashion regime?

More precisely, in order to assess the role and potential of sustainable, circular start-ups in the fashion industry's transition toward a CE, emerging issues, barriers, drivers, and opportunities that prevent and facilitate start-ups' upscale to the fashion market have to be identified.

To deliver an answer to this question, the concept of circular business model and innovation, and transition theory are integrated to explain how business model innovations and strategies at the company (micro level) influence changes at the meso or macro level, and vice versa. As the analytical framework, the multi-level perspective (MLP) by Geels (2011) is used to understand circular transitions. The outcome is a conceptualization of how start-ups foster radical regime change by working at the micro level.

1.4 Scientific and societal relevance

Scientific relevance "encompasses taking up actual scientific discussions or trends in the field in terms of questions studies and methodologies use, as well as introducing or advancing innovative concepts and approaches" (Pohl & Wuesler, 2016, p. 793). That way, a research increases our understanding of a particular process or phenomenon (Elger & Shaw, 2013).

As circular business model innovation steered by start-ups in socio-technical transition still remains an under-researched area, this research wants to empirically contribute to the research on CE transitions and business model innovation by looking explicitly at current circular practices in a highly fragmented and complex industry - the fashion industry. Business models innovations in the context of fashion have been previously studied, however their influence on the fashion industry has not. By applying the MLP framework by Geels (2011), the interrelations between business model innovations and the fashion industry's circular transition is explored which will contribute to the lacking conceptual groundwork on the role and opportunity of circular start-ups, and the hampering and facilitating factors they are subjected to in the fashion industry.

According to Elger & Shaw (2013), societal relevance is defined as a type of relevance where society directly benefits as a result of increased understanding. Another definition is given by Benedetto et al. (2021, p.2): "Societal relevance entails research activities providing results for use and benefit beyond science, often conducted through productive interactions of researchers with society, individual

beneficiaries, organizations, or nations." In other words, societal relevance refers to whether the research comprises economic, health, environmental and cultural issues of interest to others (Benedetto et al., 2021).

The results of this study are valuable to policymakers, practitioners and the field of science. Firstly, the research provides insights into the barriers that withhold the niche-level start-ups from inducing radical fashion regime transformation. Thereby, it gives direction to the development of effective measures that allow start-ups to access the needed resources and tools to realize their ambitions through their business models, and contribute to the acceleration of the circular fashion transition. Secondly, the insights are of value to practitioners by delineating the mismatch between the current barriers and drivers, opportunities of, and the resources needed for start-ups. Hereby, the outcomes could act as a guide helping other companies in transitioning and could be applied to other industries that attempt a transition. That way, this research also entails a practical relevance. Lastly, the research and its findings will directly benefit actors in the fashion industry such as brands and manufacturers by showing and explaining the added value of implementing circular practices into their business models compared to the traditional take-make-waste model, and the CE in general. Thus, this research contributed to the current state of CE theory.

Chapter 2 - Theoretical and conceptual framework

The theoretical framework serves as a guide on which to build and support a research. In addition, it provides the structure to define how the study will be approached philosophically, epistemologically, methodologically, and analytically (Grant & Osanloo, 2015). To support the proposed discussion, it is necessary to understand the existing theoretical bases on CE, business model innovation, transition theory, and start-ups. For this purpose, both academic and gray literature are used.

2.1 Multi-level perspective on socio-technical transitions

In recent years, a large focus on broader, intercorrelated processes for sustainability has developed. This shift of attention to socio-technical regimes recognizes that both businesses and technologies are part of a social and economic system (Smith et al., 2005).

The MLP analyzes structural change from a multi-dimensional perspective consisting of three levels. It is distinguished between a higher macro economic socio-technical landscape, the existing socio-technical regime with actors at the meso level, and micro niche innovations that are introduced outside the incumbent market. Their interaction among each other is presented in Figure 1. This approach is a means for explaining how technological transitions evolve, and for addressing the involved complexities that come about with such transitions by incorporating inter-linkages between developments in all levels. Thus, the MLP is considered as a suitable approach to analyze sustainability transitions (Geels, 2011).

According to the MLP, transitions (also termed as systems innovations) are defined as shifts or “changes from one socio-technical system (or regime) to another” (Geels, 2006, p.165). In other words, transitions result from alignments between developments happening at multiple levels. However, transitions can be also generated from changes in consumer behavior, regulations, culture, and business models (Geels, 2011). All three levels differ greatly in terms of their stability. The stability of an existing system is determined by the interaction between the material aspects of the system, actors and organizations, and the rules that guide their perceptions and actions. The path dependence which locks in existing socio-technical systems takes place at the meso-level. At this level, there are multiple regimes which constitute the deep structure of systems. However, only one is the technological /product regime. The others are the science, policy, socio-cultural, users, markets, and distribution networks regime. They represent different social groups holding various kinds of rules (regulative, normative, cognitive) (Genus & Coles, 2008). By acting according to the regime, these social groups stabilize the regime (Geels, 2011).

Through pressures from niches and the landscape, windows of opportunity open up for niche innovations to arise and to influence the regime. In fact, niches can act as spaces for experimentation

protected from market selection pressures, or to enable social networks supporting radical innovation to be built up (Geels & Schot, 2007). Niche innovations are powerful in the sense that they are able to enter or even reform the existing regime completely (Geels, 2011).

It is important to note that niche initiatives and innovation do not necessarily have to be "new", often these are old solutions that have been reinvented. By harboring arguments for change, niches offer the building blocks for transition pathways (Geels, 2011). Mainstreaming and strengthening emerging niches requires the change of boundary conditions in favor of these niches.

As described previously, the socio-technical landscape influences both niche and regime dynamics. It is described as the exogenous or external context within the MLP as it changes incrementally under large global developments and in the short run, is independent from niche and regime influences. Within this meso level, societal sustaining elements are demographic trends, political ideologies, societal values, and macro-economic patterns (Geels, 2011).

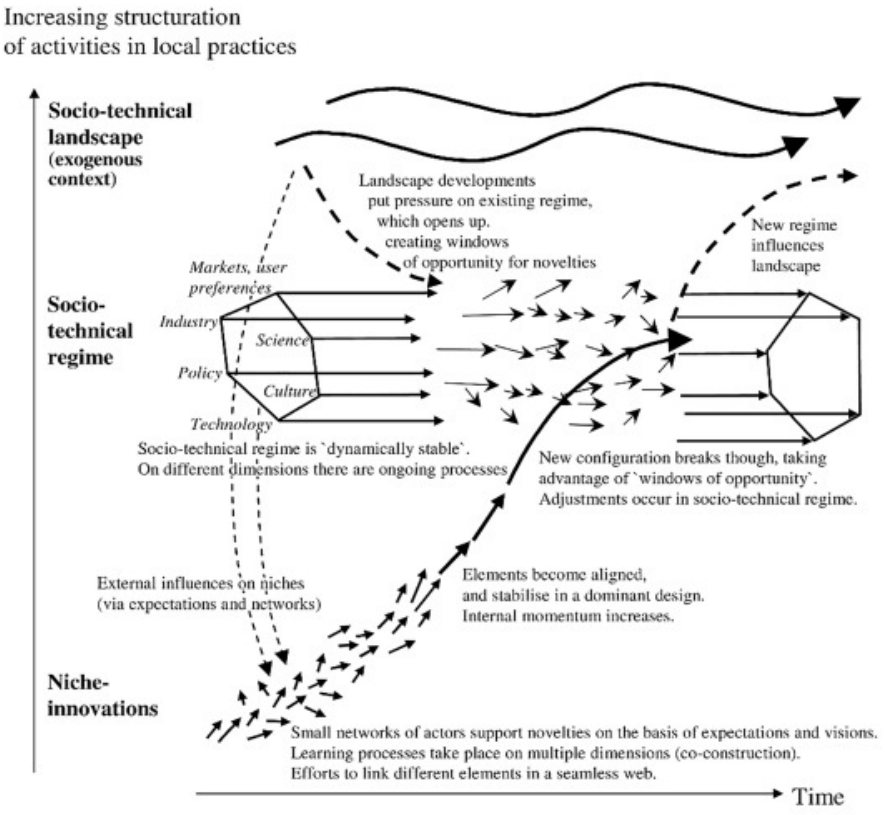


Figure 1: Multi-level perspective on transitions (Geels, 2011, p.28)

Based on the MLP, transitions are made up of distinct phases. In the first phase, radical innovations emerge in niches, often outside or at the margin of the existing regime, but are unstable and fragile. There are no stable rules, instead there are various innovations competing with each other. Actors improvise and engage in experiments to work out the best product, service or design and find out what the consumer wants. The innovations do not yet form a threat to the existing regime. In the second phase, new innovations are used in small market niches, which provide resources for technical development and specialization. The new technology develops a technical trajectory of its own and rules begin to stabilize. Here, consumers build up experience and familiarity with the new technology, and may form clubs to do lobbying work. However, the innovation still forms no major threat to the existing regime that is institutionally, organizationally, economically and culturally entrenched. There is a possibility that new technologies and innovations remain stuck in the niche level for a long time, especially when there is a mis-match with the existing regime (Geels, 2006; Geels, 2011).

As long as the regime remains stable, there is little chance for niche innovations to breakthrough. However, if they experience wide diffusion and competition with the regime, internal drivers like powerful actors that support niche innovations by investing their financial or political resources, and external circumstances at the macro level create windows of opportunities. These windows emerge when tensions occur between elements in the socio-technical regime that cannot be solved by incremental improvements or when social, cultural or economic changes at the landscape level put pressure on the regime. These internal issues may be exacerbated by stricter regulation and changing consumer preferences (Geels, 2006).

Clearly, the breakthrough from niche- to regime level takes place in steps. Although innovation is born in specialized small market niches, it captures increasingly larger market niches through wide diffusion caused by niche-accumulation. During this process, market shares of the new innovation increase and supportive elements such as infrastructures, regulations, and consumer practices are created and linked with each other. As the new technology/business model/innovation enters the mainstream market it competes with the dominant regime. In the last phase, the established regime is gradually replaced by the new socio-technical system which may hold the power to influence wider landscape developments (Geels, 2006). To conclude, the MLP shows that transitions are not necessarily driven from the bottom-up but may also be initiated at other levels. It also shows that in order to effectively contribute to a transition, the systemic complexity and the interrelation of actors and levels must be acknowledged (Jørgensen, 2012).

2.2 Criticisms on the multi-level perspective approach and responses

The first criticism is that it is unclear how these levels should be analyzed on an empirical level, meaning that a socio-technical regime could be defined as one of several empirical levels (Berkhout et al., 2004). Geels & Schot (2007) refer to this issue by giving an example of the electricity sector where "one could study a regime at the level of primary fuel (coal, gas, oil) or at the level of the entire system (production, distribution, consumption). What looks like a regime shift at one level may be viewed merely as an incremental change in inputs for a wider regime at another level" (Geels & Schot, 2007, p. 400).

Another source of debate refers to the little attention directed to the role of agency in understanding transitions in socio-technical regimes. According to Smith et al. (2005, p. 1492), the conceptual approach is "overly functionalistic. Despite the breadth of the regime concept, there is a tendency to treat regime transformation as a monolithic process, dominated by rational action and neglecting important differences in context. We also argue that existing approaches tend to be too descriptive and structural, leaving room for greater analysis of agency."

The third criticism refers to the unilinear, univalent, and unidimensional nature of such an approach. According to Berkhout et al. (2004), too much emphasis is placed on the bottom-up niche to regime change, also described as niche-driven bias. Instead, one should also consider institutional, economic, political, social or cultural settings of the macro level as the locus of regime transformation, as well as internal and external drivers. They argue that multi-level approaches are "unilinear in that they tend unduly to emphasize process of regime change which begin within niches and work up, at the expense of those which directly address the various dimensions of the sociotechnical regime or those which operate "downwards" from general features of the sociotechnical landscape" (Berkhout et al., 2004, p.19); "univalent in that they underplay problematic nature of political intentionality and social choice when faced with multiple perspectives and interests. This leads to a tendency to reify notions of consensus and public interest, neglecting consideration of power and the benefits of strategic properties such as diversity and reversibility" (Berkhout et al., 2004, p.19); "unidimensional in that they under-discriminate between different transitions contexts, such as those associated with drivers for change which are alternatively internal or external to the socio-technical regime, or which differentiate between changes than happen due to historic contingency and those that are result of the deliberate exercise of agency" (Berkhout et al., 2004, p.19).

Further criticisms were voiced by Foxon (2011) who claims the MLP neglects economic variables, and by Meadowcroft (2011) who argues about the possible omission of institutions and ideologies, and suggests the beneficial, greater role of politics.

In general, the MLP is seen to be suitable for investigating transitions as it enables to simplify complex large-scale shifts through the analysis of processes and their interplay in all levels. Thereby, weaknesses,

barriers, opportunities, and drivers in the fashion industry's transition towards circularity can be identified. However, the emergence of the MLP as a conducive approach has been variously criticized. Following the criticisms, Geels (2011) has formulated responses to them.

Geels (2011) admits the possibility for the object of analysis to be considered as a set of different levels. In other words, the MLP does not require a certain scope of the empirical object. In fact, the concept of regime is applicable to empirical objects of different levels (either primary fuels or entire electricity system). Thus, the empirical level of the object of analysis must be determined before the MLP with its analytical levels is applied. The unit of analysis in transitions in socio-technical regimes are situated at the level of organizational fields which are defined as organizations of institutional life such as suppliers, consumers, and regulators agencies. By that, focus is put on the totality of relevant actors (Geels, 2011; Geels & Schot, 2007). The second criticism relates to the underestimated role of agency. Accordingly, Geels (2011) argues that, in fact, agency exists in the MLP in the form of social groups that enact trajectories and multi-level alignments.

Thirdly, to overcome the dominance of niche-driven bias in the MLP, Geels (2011) has introduced four transition pathways with varying levels of timing and nature of multi-level interactions: transformation, reconfiguration, technological substitution, and de-/re-alignment. In the transformation path, landscape developments pose pressure on the existing regime, forcing regime actors to modify the direction of development paths and innovation activities At this moment, niche innovations are not sufficiently developed yet, thus, they do not break though. However, when niche-innovations are well-developed, the regime may adopt symbiotic innovations in response to landscape pressure. This so-called reconfiguration path describes the change of and adjustment of the basic architecture of the regime through the subsequent incorporation of niche innovations. In the substitution path, several niche innovations compete with each other when pressure is exerted on the existing regime by the landscape level. When windows of opportunity open, niche innovations will break through and replace the regime. Lastly, major and sudden landscape changes can cause the de-alignment of the regime. This disintegration makes space for the emergence of numerous niche innovations which coexist and compete for some time. A new regime re-aligns once one niche becomes dominant (Geels, 2011; Geels & Schot, 2007).

2.3 Circular economy

For the first time, the CE model was introduced by Pearce & Turner (1990) who criticized the linear economic system and highlighted the environment-economy intercorrelation by assigning economic functions to the environment. Such include the environment being a supplier of resource, an assimilator of waste, and a source of utility. Their work draws inspiration from ecological economist Kenneth Boulding (1966) who described the earth as a closed system with limited resources. The concept of CE with reproduction and recycling practices is a response to the limits of the planetary and economic system attributed to overconsumption and increasing ecological loss (Hofmann, 2019; Rizos et al., 2017). Since then, various disciplines and research fields, such as industrial ecology, cradle-to-cradle design, and product-service systems have emerged and influenced our understanding of the concept of CE. Many authors agree on the change of structural and technological settings of the current economy necessary for shifting to sustainability characterized by optimized energy and materials inputs (Rizos et al., 2017).

In recent years, the CE term has received a great deal of attention in the fashion industry. Despite ambiguity rooted in its definition, different interpretations commonly highlight the need to create closed loops of material flows and reduce the consumption of virgin resources and its adverse environmental impacts (Rizos et al., 2017, Ellen MacArthur Foundation, 2015).

The Ellen MacArthur Foundation has synthesized and amplified the frameworks and concepts mentioned above under the concept of CE that is "*restorative and regenerative by design. Relying on system-wide innovation, it aims to redefine products and services to design waste out, while minimizing negative impacts. Underpinned by a transition to renewable energy sources, the circular model builds economic, natural and social capital"* and as *"a systems solution framework that tackles global challenges like climate change, biodiversity loss, waste, and pollution. It is based on three principles, driven by design: eliminate waste and pollution, circulate products and materials (at their highest value), and regenerate nature"* (EllenMacArthur Foundation, 2021, p.3).

The CE is based on three principles that are depicted in Figure 2. The first principle concerns the preservation and enhancement of natural capital by controlling finite stocks and balancing renewable resource flows. If possible, the CE applies technologies and practices that make use of renewable or more sustainable resources. Based on the second principle, resource yields are optimized by circulating products, components, and materials at the highest possible utility in technical and biological cycles. As can be seen in the figure, circular systems prefer using tighter, inner loops rather than outer loops, meaning that maintaining a product or component is much more likely adopted than recycling. This preserves more energy and value. Lastly, the third principle concerns the stimulation of system effectiveness by recognizing and taking out negative externalities (Ellen MacArthur Foundation, 2015.)

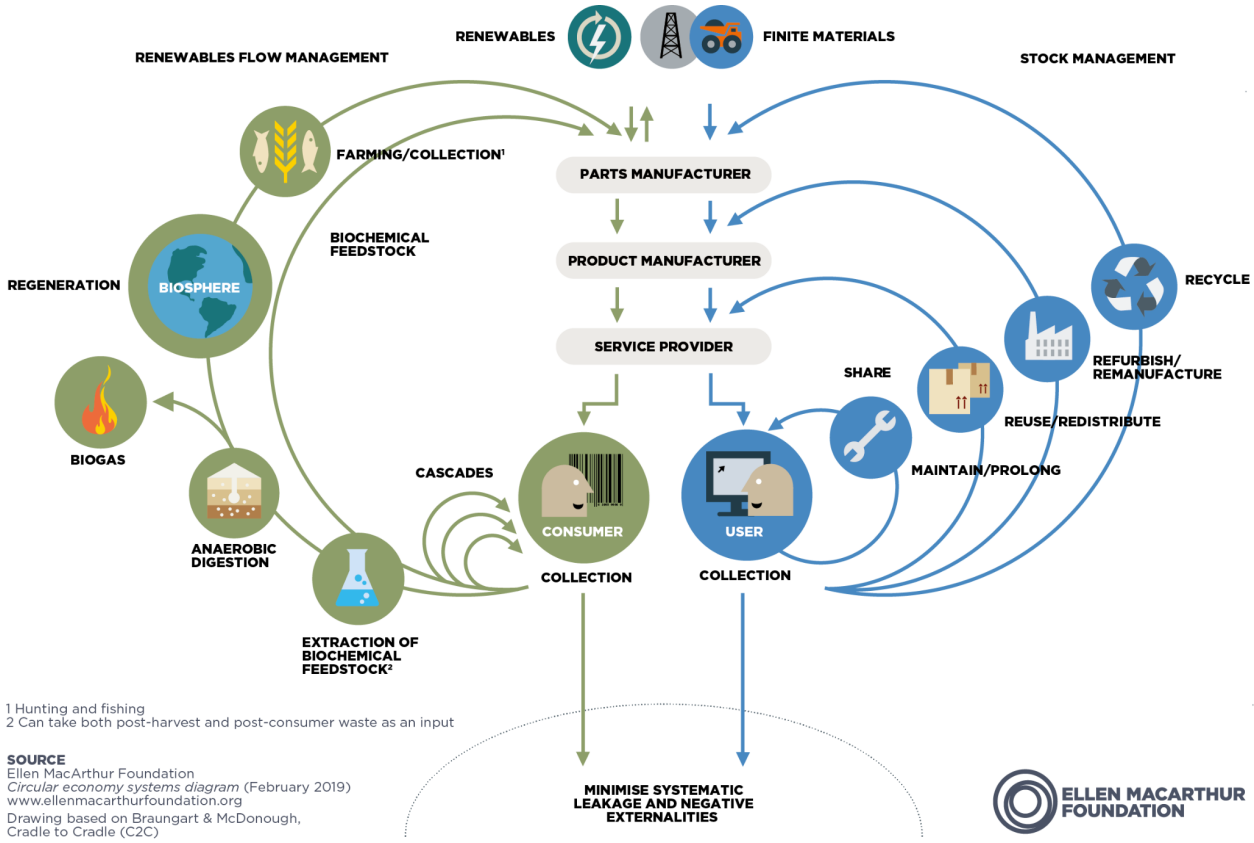


Figure 2: Circular economy systems diagram (Ellen MacArthur Foundation, 2015, p.6)

2.6 Transition towards circular fashion

The CE is grounded in a full life cycle and systems view. For fashion companies, the CE is relevant from many perspectives including material selection (e.g. recycled instead of conventional material), design optimization (e.g. less mixed materials), manufacturing methods (e.g. waterless dyeing), materials and product reuse and recycling, and alternative systemic business models (e.g. rental) (United Nations, n.d.).

As explained in the previous chapter, the CE uses as few new resources as possible. The so-called R-ladder illustrates adequate strategies that aim for this (see Figure 3). These are: refuse and rethink (R1), reduce (R2), reuse (R3), repair and refurbish (R4), recycle (R5), and recover (R6). As a general rule, strategies at a higher level need less resources. Hence, such strategies reduce the negative environmental impact. In case no other strategies are an option, recycling will come into use. Additionally, circular strategies can be implemented in innovations of product design, technologies, and business models (Rood & Kishna, 2019).

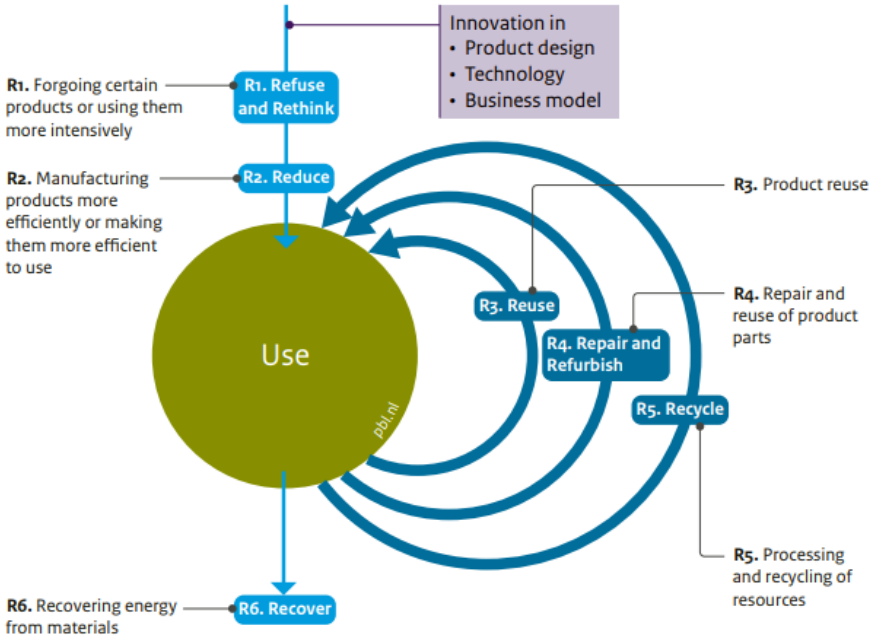


Figure 3: R-ladder of circular strategies (Rood & Kishna, 2019, p.17)

In their work, De Jesus & Mendonca (2018) provide an overview of factors facilitating and preventing a transition toward circularity, thereby, they distinguish between technical, economic "hard" factors and social, institutional "soft" factors. While driving factors enable and foster transitions towards a CE, barriers exert a constraint impact. On the one hand, facilitating factors include, for instance, the availability of resource-optimizing, remanufacturing, and regenerative technologies; a rising resource demand and resource depletion, but also related supply-side trends; an increasing environmental legislation and standards; and increasing social awareness and shifting consumer preferences. On the other hand, factors that obstruct or hinder a circular transition, for example, are inappropriate technologies; large capital requirements, significantly higher transaction and initial costs, and uncertainty about return and profit. Soft barriers can be a weak legal system and high rigidity of consumer behavior and deeply locked-in business routines.

2.7 Business model innovation for circular economy

There is growing consensus that circularity and sustainability can only be achieved through a radical re-organization and -structuration of the whole fashion system (Kozlowski et al., 2016; Geissdoerfer et al. 2018). In the context of fashion, the concept of sustainability is often referred to in terms from a supply chain perspective (Ethical Fashion Group, 2016). However, sustainability initiatives must move beyond the supply chain and less focus should be put on the maximization of profits as a primary obligation to shareholders. More systematic and holistic approaches are reflected in business model innovation and consumer engagement that take all stakeholders within the fashion system into account (Kozlowski et al., 2016; Geissdoerfer et al. 2018).

Pedersen et al. (2016, p.269) state that business model innovation is about "developing new ways to capture, create and deliver value and moves beyond more narrowly defined categories, such as product service, and process innovation." The success of a company relies on the innovation of business models. A lack of effort in investing into their modification, poses high risks of competition and of current business models becoming redundant. A particularly important characteristic of business model innovation is its holistic approach, meaning that it considers the whole structure of an organization, instead of being scaled down to, for example, just a technological innovation (Pedersen et al., 2016). Hence, business model innovation is regarded as a solution to transform an organization as a whole due to its ability to analyze, structure, plan, and communicate in spite of complex organizational settings and practices (Geissdoerfer et al., 2018). At this point, it should be noted that business model innovation does not necessarily involve the development of new products, technologies, or markets, but instead comprises changing the revenue stream, synchronizing the time horizons, or integrating the incentives (Veleva, 2021). For instance, leasing instead of selling clothes enables overcoming the upfront costs for customers, and thus has led to the expansion of the leasing fashion market. It is distinguished between incremental and radical business model innovation, whilst also a combination of both types is possible (Nußholz, 2018; Pedersen et al., 2016).

2.8 Circular business models and innovations in the fashion industry

The practice-oriented approach of business model innovation is closely related to the concept of business model. Today, business model thinking has developed into a popular concept in the academic and practice community, and is widely applied across different industries (Bidmon & Knab, 2018).

A business model is the "simplified representations of the elements of a complex organizational system and the interrelation between these elements" (Geissdorfer et al., 2018, p.713), and describes how an

organization creates, delivers and captures value (Hofmann, 2019). More specifically, a business model is defined by its value proposition (What value is offered to whom?), value creation and delivery (How is value provided?), and value capture (How does the company generate value?) (Gillabel et al., 2021; Schaltegger et al., 2016; Jonker et al., 2021).

In the context of transitions, "Business models have been ascribed the potential to disrupt entire industries, because they connect multiple actors, mediate between the production and the consumption side of business and support the introduction of novel technologies into the market." (Bidmon & Knab, 2018, p. 903). Furthermore, business models occupy three distinct but complementary roles in societal transitions. First, business models can be a part of the socio-technical regimes. It can be assumed that the current stable regime derives from existing prevailing business models that inhibit transition. For example, in this research, the current dominant linear business model can be understood as the stabilizing backbone of the current regime of the unsustainable fashion industry. On the other hand, business models can facilitate socio-technical transitions and by that, act as intermediaries between the niche and the regime level. Well-established and novel business models are able to promote new technology and practices and move them from the bottom-up. Lastly, business models can be subject to innovation, and as such they can be non-technological niche innovations themselves. To summarize, indeed business models can drive societal transitions (Bidmon & Knab, 2018).

Business model innovation takes place at different points along the value chain. Bauwens et al. (2019) distinguish between internal innovation being core and enabling technologies, upstream innovation that comprise the interaction and collaboration with suppliers to create value and circular processes, and downstream innovation such as product system service models and the consumer's active involvement in CE related activities. While internal innovations are largely technological, both the downstream and upstream activities facilitate social innovations by influencing the relationships with other actors in the value chain. A further distinction is made between core (product specific) and enabling technologies (applicable to many industries). Typical examples of enabling technologies are information technologies, such as platforms facilitating the sharing or trading of products and materials. An example from the fashion industry, is the online marketplace Vinted for buying, selling, and exchanging new or secondhand items, mostly clothing.

According to Nußholz (2018, p.187), circular business model innovation entails how *"to create, deliver, and capture value while implementing circular strategies that can prolong the useful life of products and parts (e.g. repair and manufacturing) and close materials loops (e.g. recycling)"*, while circular business models are defined as "business models that are suited for the Circular Economy by incorporating elements that slow, narrow, and close resource loops, so that the resource input into the organization and its value network is decreased and waste and emission leakage out of the system is minimized" (Geissdoerfer et al., 2018, p.713). Within the fashion industry, the objectives of circular business models include the use of safe and recycled or renewable inputs for textiles, the longer use of safe textiles, and the recycling of recyclable textiles at end-of-use (Ellen MacArthur Foundation, 2020; Lisca et al., 2021).

Prominent circular business models are (1) circular supply models that replace virgin resources with renewable or recovered materials, (2) resource recovery models that convert waste into secondary raw materials, (3) product life extension models that extend the use of existing products, (4) sharing models that facilitate the sharing of underutilized products, and (5) product service system models that offer service rather than products (OECD, 2018). Main circular business models are resale, rental, repair, and remaking (EllenMacArthur, 2021). By 2030, these business models are estimated to expand from 3.5% to 23% of the global fashion market as customers are constantly finding new ways of accessing fashion, motivated by factors such as affordability, empowerment, convenience, and environmental awareness (EllenMacArthur, 2021).

2.9 Start-ups as innovation precursors for circular economy in the fashion industry

The business of sustainable entrepreneurs is based on the principles of sustainability, collaboration and innovation (Bauwens et al., 2019; Ostermann et al., 2021). Sustainability-driven start-ups aim to deliver long-term environmental, social and economic benefits simultaneously (Karani & Mshenga, 2021; Veleva, 2021). They respond to opportunities inherent in environmentally relevant market failure by delivering highly disruptive and radical innovative sustainable products and services, and practical solutions. In general, they work in niches with high uncertainty and risks, however, they hold great potential to accelerate and transform industries toward sustainability (Bauwens et al., 2019; Ostermann et al., 2021, Veleva, 2021).

Compared to incumbents, start-ups are able to adopt circular business models at the beginning, take a holistic perspective at their business models, and monetize design-to-last and maintenance efforts. Typical limitations to the implementation of circular business models such as administrative issues are less significant to start-ups. Due to more horizontal management styles, decreased bureaucratic structures and more informal communication channels, start-ups maintain more flexibility and responsiveness to changing market conditions (Henry et al., 2020).

There are other, more indirect ways for start-ups to impact other (established) companies by acting as role models. For instance, established firms can copy or modify (partly) business models of circular start-ups, as they recognize the early market success of such start-ups and an increasing competitive pressure. In addition, collaborations and shared learning may occur not only between circular start-ups and established firms, but also among circular start-ups. In particular, many circular start-ups operate in business-to-business (B2B) markets (Bauwens et al., 2018; Rigtering & Behrens, 2021). An example of such collaboration and networking is the Spanish clothing brand Lavandera that sources its fabrics from Recovo which is a resale platform where brands buy and sell left-over fabrics. This way not only

connections among various brands, retailers and designers are created, but textile waste is significantly reduced and the material's life is extended.

2.10 Conceptual framework

As previously stated, for niche innovations to break through and replace the current regime, they must hold a high degree of stability (Geels & Schot, 2007). The degree of stability is based on three processes being the articulation of visions and expectations, learning processes, and the establishment of social networks. According to Bidmon & Knab (2018), business models can be a form of non-technological niche innovation that fulfill these criteria of stability. Successful (novel) business models articulate expectations and visions that are robust (shared and supported by many actors), specific (guiding coordination of actors), and of higher quality (substantiated by ongoing projects). Additionally, business models enable second-order learning processes, and involve and mobilize broad, deep social networks. These stability traits can enable novel business models to emerge at a level that exceeds that of technological innovation, thus stable business models become a substantial part of the new regime (Bidmon & Knab, 2018).

The authors extend the MLP by distinguishing between the level of business model niche and technological niche in Figure 4. A number of novel business models (blue dotted triangles) are developed and experimented with until they gain high stability in order to break through and become part of the regime. Both niche levels are exposed to the influences of the meso- and macro level in the MLP, but can also influence each other (dotted arrows) (Bidmon & Knab, 2018). Business models are seen to be strong facilitators of transitions as they provide new means of creating and capturing value resulting in strong value networks shared by many actors. Hence, their chance of boosting large changes within transitions is highly probable (Bidmon & Knab, 2018).

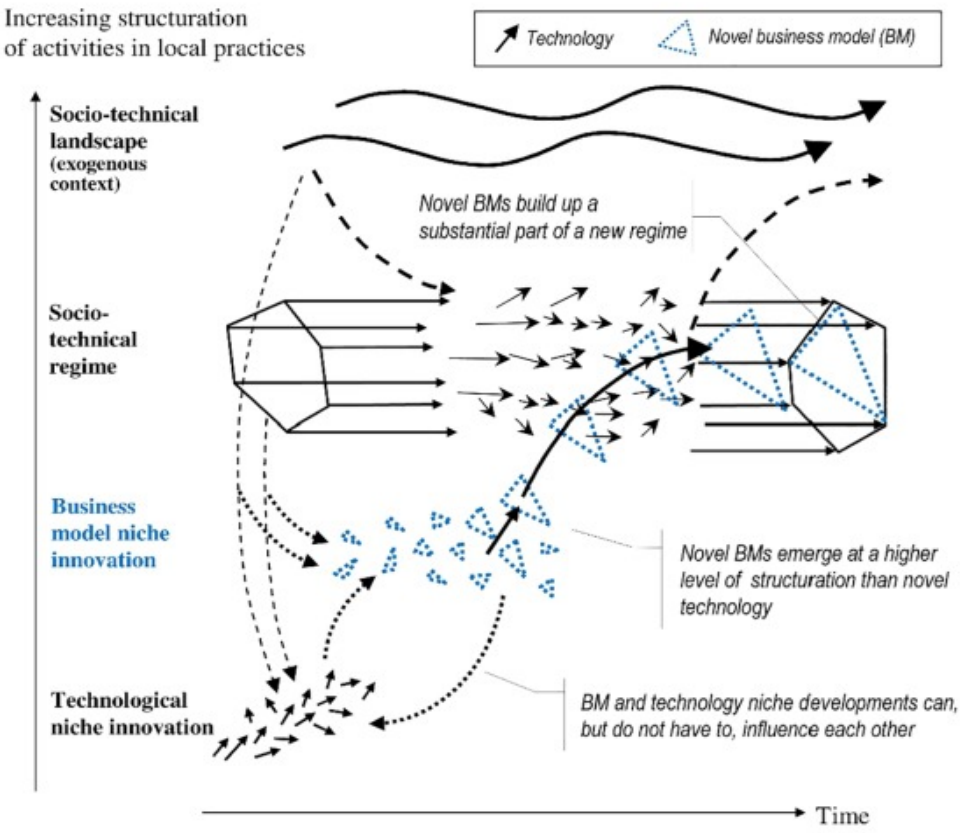
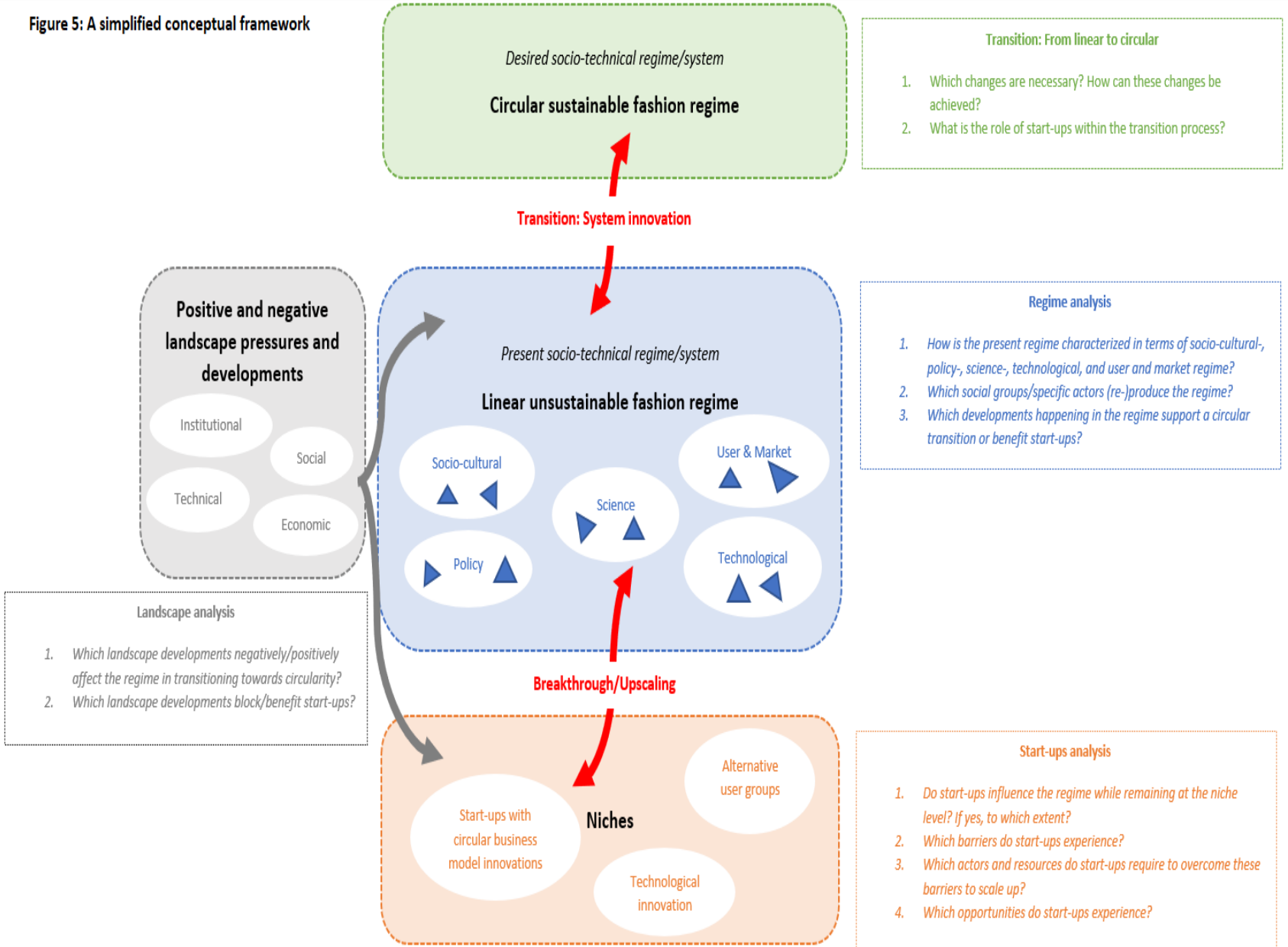


Figure 4: Business model niche innovation and technological niche innovation (Bidmon & Knab, 2018)

As the MLP approaches transitions through a multidimensional perspective by incorporating interlinkages and dynamics between different levels of society, the MLP is assumed to be a suitable framework for the investigation of the role of an entity, in this case fashion start-ups with circular business models in the context of a whole transition. To conclude, the MLP provides a relatively straightforward way to classify and simplify the analysis of complex, large-scale socio-technical systems in a comprehensive manner. Against this background, the conceptual framework of this research (Figure 5) applies the MLP combined with the third role of business models in societal transitions by Bidmon & Knab (2018) - to be more precise, business models as non-technological niche innovations. A deeper explanation of the conceptual framework and its extension is presented in the next chapter.

Figure 5: A simplified conceptual framework



2.11 Operationalization of the conceptual framework

In order to answer the research question “Which factors prevent and facilitate the upscale of start-ups to the dominant fashion regime?”, the above conceptual framework has been developed. Based on this framework, the fashion industry is analyzed on three levels such as the regime which is the dominant culture, structure and practices including the root causes of persistent problems; landscape influences which either reinforce or challenge the status quo; and niche developments and innovations which involve the experimentation with alternative ways of doing, thinking and organizing. Therefore, the research question may be refined to: **Which specific properties prevailing in the user and market, policy, technological, and socio-cultural regimes hinder the transition process and directly affect the success of start-ups? Which actors and resources do start-ups require to overcome internal and external regime-related barriers?**

According to Jonker et al. (2021), the organization of a CE requires and results in a radically different organizational approach at various institutional levels. In other words, by realizing a CE, changes in and between organizations, in and between sectors, and in systems take place. Such changes hold different degrees of impact including organizational change (improving the existing practices within the organization), transformation (using substituted technology and competencies as new solutions), and transition (achieving a new system or subsystem design through a paradigm shift). To clarify, a transformation comprises the creation of a new business proposition based on existing procedures and competencies, while a transition means the radically changed way we work including new procedures, agreements, and government rules. The authors highlight that “working on sustainability can be seen as an improvement or a transformation. Working on the circular economy inevitably leads to transition.” (Jonker et al., 2021, p.15).

By assuming the CE to be a transformative mechanism, a system perspective that takes into account the dynamic and evolving aspects of change is needed. Several levels, scopes and entities make up the CE. Thus, as the MLP also suggests, several stances including the institutional level, current fashion industry’s structure, organizational strategies, and societal values and norms must be considered (Chizaryfard et al., 2021).

The meso level represents the existing linear, unsustainable fashion regime and its response to the circular, sustainable business model innovations by start-ups. Borrowing from the theoretical framework, further refinement of the conceptual framework is possible. In order to shift from the linear to a circular fashion regime, developments at all three levels must align, or changes in consumer behavior, regulations, culture etc. take place. The path dependency which locks in the linear system is driven by multiple sub-regimes (see Figure 6) being attributed to the high rigidity of consumer behavior (socio-cultural), weak and often voluntary legislation (policy), inadequate recycling technologies and infrastructure (technological), competitive and lock-in business thinking (market), and higher transaction- and initial costs, and uncertainty about profit (market). At the same time, each sub-regime

depicts circularity-supportive trends, inter alia, an increased awareness and demand, mandatory, revised, and new legislation, and the development of regenerative technologies. At this unit of analysis, guiding questions are: **How is the present regime characterized in terms of socio-cultural-, policy-, science-, technological-, and user and market regime? Which social groups or specific actors (re-) produce the regime? Which developments happening in the regime support a circular transition or benefit start-ups?**

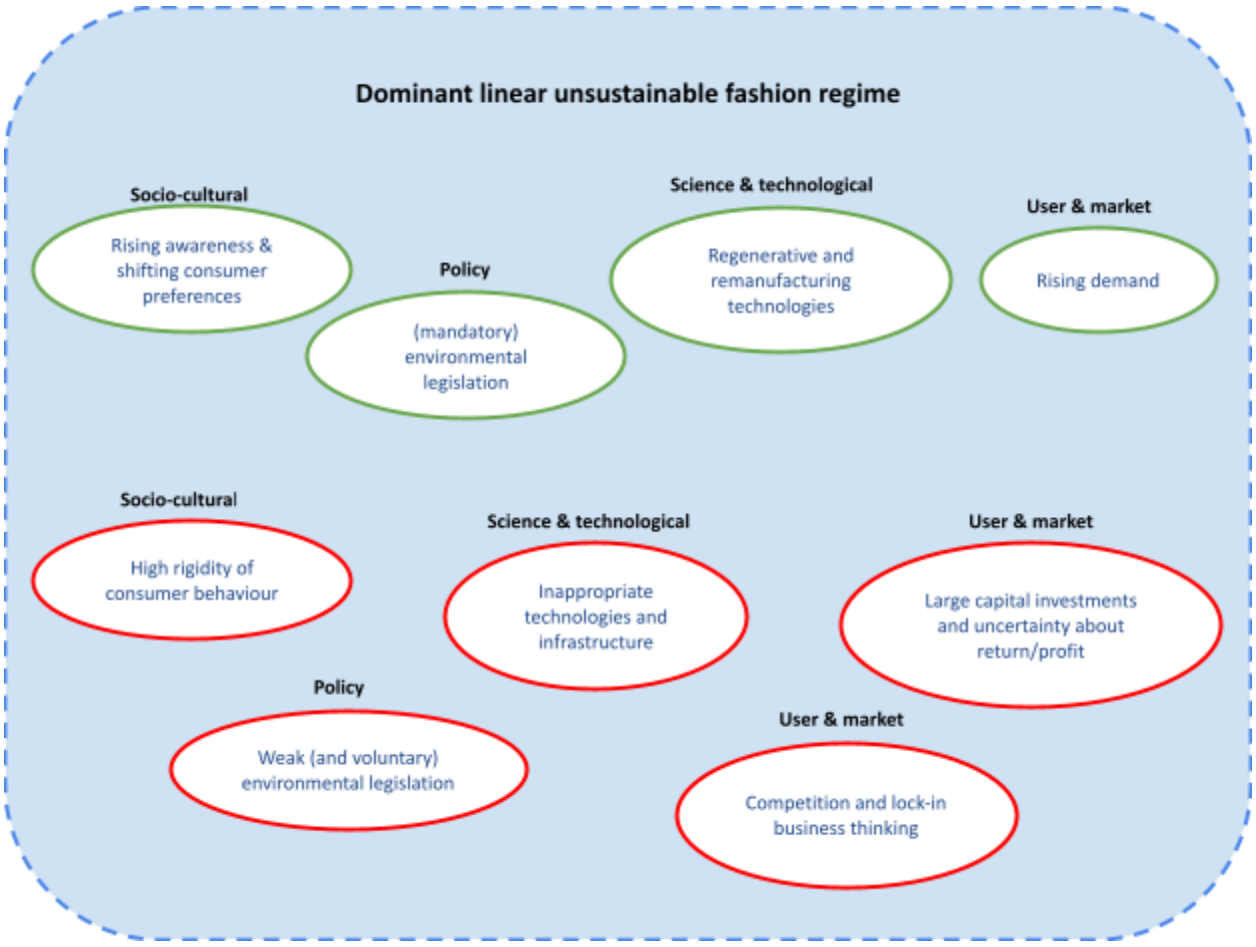


Figure 6: Extended conceptual framework - Regime

Prior to this research, relevant, positive and negative landscape pressures have been identified (see Figure 7). Those are an increased climate action at a global level and social justice as a response to environmental disasters (social & institutional), digitalization and closely related rising popularity of E-commerce and social media (demographic), and the macroeconomic force of the pandemic (Buchel et al., 2022). This research will investigate potential other landscape pressures.

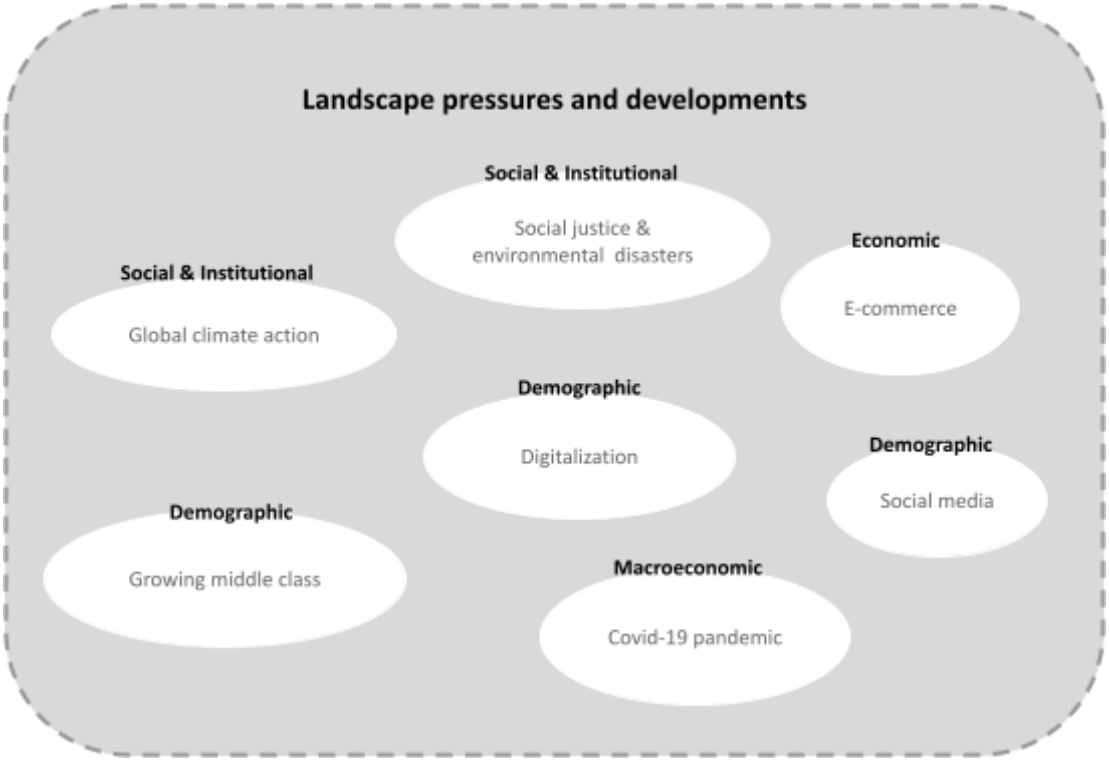


Figure 7: Extended conceptual framework - Landscape

All three levels are interactive to the extent that trends such as demographic, societal, political and macroeconomic exert pressure on the linear current regime, but also create windows of opportunity for circular business model innovation by start-ups to gain broader acceptance, acknowledgement, and eventually become dominant. This study focuses on lease, subscription rental, recommerce, and recycling business model innovations. Here, some consumers engage and eventually become fully entrenched with these business model innovations, but the regime is not threatened yet (see Figure 8). For wide diffusion and serious competition with the regime, internal niche-dynamics and external developments at the higher levels are required. Through gradual niche-accumulation and the creation and linking of supporting elements, the innovation will reach larger market niches. At this unit of analysis, guiding questions are: **To which extent do start-ups influence the regime while remaining at the niche level? Which barriers do start-ups experience? Which actors and resources do start-ups require to overcome these barriers to eventually scale up?**

Figure 8: Extended conceptual framework - Niches

Finally, once each level and their interaction have been analyzed, a full picture of the context is gained. These findings will deliver answers to the questions: **Where are and which changes are necessary for a transition and how can these changes be achieved?** This will generate final conclusions for the main research aim on general and specific factors that prevent and facilitate the success of start-ups, and their potential role within the transition process.

Chapter 3 - Methodology

The main and guiding research question(s), and aim imply a social sciences perspective. According to Bryman (2012, p.5), “social research and its associated methods do not take place in vacuum”, meaning that research is exposed to the influence of factors such as chosen theories, the researcher’s view about the relationship between theory and research, and the researcher’s assumptions on how research is conducted (Bryman, 2012). The subsequent chapters describe the research strategy, philosophy, methods, and validity and reliability of the research.

3.1 Research strategy

The research strategy combines the chosen research philosophy, the research approach and the methodological choice of the research. Therefore, the research strategy is the plan to collect and analyze data in order to answer the research question (Lewis et al., 2019).

Since little research has been done on circular business model innovations in combination with entrepreneurs in the fashion industry, this research is exploratory, where conceptual thinking and theory development in social environments are interrelated (Lewis et al., 2019). It is about exploring the role of start-ups with circular business model innovations in the fashion industry’s circular transition by identifying technical and economic factors (hard drivers, hard barriers) and social and institutional factors (soft drivers, soft barriers) new entrants face to influence the chances of a successful circular transition. This is achieved through the “real-time” interviewing of relevant stakeholders and start-ups in the fashion industry, where new and complementary insights can be gained. At the same time, this research is explanatory to the extent that existing theories on the MLP, CE, business model (innovation), and start-ups have been considered. This research is deductive as the underlying transition theory on MLP guides this research.

3.2 Research philosophy

When doing research various types of assumptions about realities (ontological principles) and human knowledge (epistemological principles) are made (Guba & Lincoln, 1994). This influences how the research questions, applied methods, findings, discussions and recommendations are understood and interpreted (Khan, 2014; Lewis et al., 2019).

The fundamental philosophy underlying this thesis can be placed in the realm of the critical realism paradigm (post-positivist ontology) and objectivist epistemology. While ontology refers to “assumptions about the nature of reality” (Lewis et al., 2019, p.133) and asks questions like “What is the world like?”,

epistemology refers to “assumptions about knowledge, what constitutes acceptable, valid and legitimate knowledge, and how we can communicate knowledge to others” (Lewis et al., 2019, p.133) and poses questions like “What kinds of contribution to knowledge can be made?”.

Critical realism concentrates on analyzing and explaining observable events and sensations by searching for the causes and mechanisms through which deep social structures shape organizational life. In the context of critical realism, reality is seen to be an external, independent, and structured ontology, however, is not directly accessible through our observation and knowledge of it (Lewis et al., 2019), meaning it is “imperfectly and probalisticially apprehendable” (Guba & Lincoln, 1994, p. 109). Regarding the methodology, this research uses solely qualitative data and applies existing theories and frameworks on transition.

3.3 Research methods, data collection and data analysis

3.3.1 Case Study

In order to identify key obstacles, drivers, needs, opportunities, and initiatives and to validate them against existing knowledge, an empirical research by means of a multiple-case study and with the conduction of semi-structured interviews was chosen. Case studies are commonly applied when “how” or “why” questions are proposed, and the focus is on a contemporary phenomenon. Interviews are considered as one commonly used data collection strategy in qualitative research (Austin & Sutton, 2015). According to Simons (2009, p.21), “a case study is an in-depth exploration from multiple perspectives of the complexity and uniqueness of a particular project, policy, institution, programme or system in a ‘real life’ context. It is research-based, inclusive of different methods and is evidence-led. The primary purpose is to generate in-depth understanding of a specific topic (as in a thesis), programme, policy, institution or system to generate knowledge and/or inform policy development, professional practice and civil or community action”. The aim of this research is to explore and understand which factors and opportunities start-ups with circular business models experience that influence their breakthrough from niche to meso level in order to accelerate the fashion industry’s transition toward circularity. Compared to a single-case study, a multiple-case study is much more powerful because it provides a more extensive description and explanation of a phenomenon in its natural setting.

The start-ups were chosen according to the principle and characteristics of the CE. In their operations, the chosen companies focus on the reduction, reuse, recycling and recovery of materials in the production and distribution and consumption processes. An overview with all interviewed and analyzed start-ups is compiled in Table 1.

Table 1: Overview of start-ups

Name	Type of business model innovation	Strategy
Drop & Loop	Recycling	Recover waste for circular products
MUD Jeans	Leasing	Optimize product utilization
Again & Again	Recycling	Recover waste for circular product
reverse.supply	Recommerce	Optimize product utilization
WeDress Collective	Rental and Lending	Optimize product utilization

3.3.2 Data collection

The empirical data has been collected from different groups being one industry expert, one incumbent fashion brand/retailer, one sustainable marketplace, and five circular fashion/textile start-ups. The data was sourced from self-conducted semi-structured interviews, industry reports, own observations, and webinars. Regarding the data source, it is distinguished between primary data that derives from the interviews, and relevant secondary data that already exists and is found in, for example, in industry reports. The inclusion of both data types generates more in-depth insights, especially when the number of interviews is limited. The interviews have been supplemented by these additional sources to gain a more in-depth insight, especially because only eight interviews have been carried out. By including a variety of data sources, a more accurate picture of current landscape developments and fashion industry trends can be formulated.

Interviews

All interviewees were contacted via LinkedIn or private email. The request template that was sent to all interviewees can be found in the Appendix. The questions that were asked during the interview covered the topics of circularity and circular transitions, business models and innovation, and Start-ups. As an introduction to the topic, the interviewees were asked to introduce themselves and about their general knowledge on the concept of a CE. Then, more specific questions relevant for this research were asked. The interviews were closed by asking the interviewees about their personal assessment of a possible circular fashion regime. The questions can be found in the Appendix. On average, the interviews had a duration of 30 to 60 minutes, were held between March 2022 and May 2022, and in English. To ensure anonymity, each interviewee is assigned a code. Subsequently, this code is used in the chapter Findings. As can be seen from Table 2, eight interviews were carried out.

Table 2: Overview of all interviews

Date	Duration	Interviewee	Country	Code
29 March 2022	35 minutes	Co-founder of circular Start-up	Netherlands	Start-up 1
04 April 2022	30 minutes	Founder of circular Start-up	Netherlands	Start-up 2
07 April 2022	40 minutes	Founder of circular Start-up	Netherlands	Start-up 3
12 April 2022	40 minutes	Head of sales of circular Start-up	Germany	Start-up 4
14 April 2022	60 minutes	Founder of circular Start-up	Austria	Start-up 5
11 April 2022	45 minutes	Sustainability lead of fashion brand/retailer with sustainable and conventional collection	Germany	Incumbent 1
29 April 2022	50 minutes	Head of Sustainability & Co-founder of E-commerce Start-up for sustainable fashion and lifestyle brands	Germany	Start-up 6
17 May 2022	60 minutes	Consultant of Not-for-profit global organization for sustainable fashion	Germany	Industry Expert 1

Webinars

A number of online events were attended that add relevant and insightful information to this research. A variety of speakers from different institutions and organizations participated in these webinars. Some events offered a panel discussion where participants were able to ask their own questions. In one case, a webinar that took place in the past was re-watched. None of the webinars was transcribed, instead relevant information was written down. An overview of the webinars is illustrated in Table 3.

Table 3: Overview of webinars

Date	Webinar	Organizer
05 October 2021	Transitioning to a Circular Business	Zalando
31 March 2022	Fashion industry deep dive - delivering on circularity	DHL
06 April 2022	Institutional arrangements for the circular economy and the sustainable use of natural resources - the role of governance in the circular transition	UNECE
07 April 2022	Webinar Apparel: Recycled fashion	CBI Ministry of Foreign Affairs

3.3.3 Data analysis

With the permission of the interviewees, all the interviews were recorded and transcribed. The transcription was executed manually, without a software as not many interviews were conducted and the data load was transparent. After the transcription, encoding was adopted, which is one of the recommended first steps to reduce and analyze the collected data. The codes represent the predefined categories of the conceptual framework to match the theoretical properties presented in the theoretical framework. The collected data was sorted and assigned accordingly to the following codes: (1) landscape level (institutional and political, economic, social and demographic), (2) regime level (fast fashion companies, market, policy, consumer, technology, culture), and (3) niche level (start-ups, circular business model innovation).

3.4 Validity and reliability of the research

The reliability of qualitative research concerns whether the results are plausible, the extent to which findings are consistent with divergent sources of information (Bryman, 2012; Neuman, 2007), and the results are repeatable (Bryman, 2012). In other words, reliability refers to the stability of the findings. Another criterion of research is validity that is concerned with the integrity of the conclusions that are generated from a research (Bryman, 2012), it represents the truthfulness of the findings.

To enhance the validity and reliability of a research, various types of methods of data collection for obtaining “true” information should be used. This research will apply a combination of primary and secondary data. As the researcher, I will collect data myself, specifically real-time, contemporary data that will be collected during the course of my research project. In contrast, secondary research involves data that has already been collected by somebody else. It involves re-analyzing, interpreting, or

reviewing past data. By including both types of data, it can be seen how past data informs, complements, and differs from my own research. As several studies have been done on business model innovation and transition theory for analyzing circularity, valuable insights as starting points for my research exist. However, the unit of analysis of this research includes current circular business model innovations, with a focus on the European fashion market. By complementing the interview data with existing literature, a rich picture can be developed and also allows triangulation and verification of the results. The inclusion of multiple interviewees from fashion brands and information and research organizations does not aim for generalization, but instead allows a deeper and nuanced understanding of the relationships between the different factors and variables presented in the conceptual framework.

Reliability and validity increase transparency, while also decreasing opportunities of researcher bias. Indeed, critical in any research is researcher bias. It can occur at the data collection stage, data analysis, and data interpretation phases (Onwuegbuzie & Leech, 2007). To avoid and minimize researcher bias, emphasis and effort will be placed in "just" sticking to the pre-formulated questions and strict recording and field notes taking. Field notes are of major importance and highly recommended as the gap in between the interviews and coding can result in memory bias and loss that may affect the interpretation of the data (Austin & Sutton, 2015). Additionally, other methods to increase the credibility and validity of research findings are "prolonged engagement, persistent observation, triangulation, leaving an audit trail, informant feedback, checking for representativeness of sources of data, clarifying researcher bias, making contrasts/comparisons, theoretical sampling…" (Onwuegbuzie & Leech, 2007, p.239).

Chapter 4 - Descriptive Findings

The MLP is applied because it argues that transitions are the result of interactions between processes and development at the niche, regime and landscape levels. Generally, it is assumed that transitions occur organically and evolutionary throughout many years. They do not occur due to one-time events, which can change the system radically, but rather many different events altogether trigger transitions (Geels, 2006; Geels, 2011). These events and developments can both be seen as barriers and opportunities for new entrants in the niche level to fail or capable in competing with fashion incumbents at the regime level.

This chapter presents the findings which were gathered from the empirical data. It has the following structure: First, the case studies consisting of all start-ups and their circular business model will be introduced. Then, the dominating unsustainable fashion regime at the meso level is described by analyzing critical properties related to the market, regulation, technology, and culture. Subsequently, general trends and developments happening at the landscape level will be presented. By drawing on characteristics of each level, their relationship and influence on each other will be investigated. The analysis will not only identify main barriers and opportunities that start-ups experience in the circular transition, but at the same time, allows to identify necessary actors and resources that are needed for a successful circular fashion transition to happen.

4.1 Circular business model innovations of start-ups in the fashion industry

This chapter introduces each individual start-up which has been interviewed by explaining their business model innovations, and by describing their proposition in the circular transition. Each Start-up's introduction closes with an overview of its business model including its value proposition, communication and distribution channels, revenue streams, key resources, and partner network.

Start-up 1: The Recycling Business Model (Textiles)

Being the first company in the Netherlands that offers a complete circular textile programme, Start-up 1 offers a customer discount in exchange. As a textile collection company, Start-up 1 gives customers the opportunity to donate their unwanted and flawd textiles in selected retail stores. Subsequently, the collected textiles are sorted and are either sold worldwide or are cleaned, sorted according to material and color, and then spun into new yarns for the production of new textiles and clothing.

At the core of the business is circularity. Accordion to Start-up 1, “the concept of a circular economy means that the term waste does not exist in the upcoming years, so waste turns into a source or resource to make new products, and that is exactly what we are doing, so we collect old clothes that is the waste of somebody else, but for us it is a source to make new yarns out of them.“

The driving force behind its business is the improper disposal of clothing: 115 million kg of clothes are thrown away into the household waste bin in the Netherlands. This amounts to 60% of the entire clothing waste. Although separate containers for clothing are provided, most of the clothing ends up in the household bin. Related to this problem, Start-up 1 states “So I’ve figured that we need to do something about it because waste shouldn’t be waste anymore. If you throw your clothes into the garbage bin, it will be burned, and that is very damaging to the environment and it’s a waste that you throw away. So in that sense, I am an entrepreneur by heart. We have to make it much easier and much more fun to collect your clothes. So that’s how we started.”

Table 4: Business Model of Start-up 1

Value proposition	Discount voucher, convenience, accessibility, sustainable and circular products, resale of sound items
Communication channels	Website, social media, open panel talks
Revenue streams	Goods sales
Key resources	Logistics, recycling and sorting facility, collection machines/boxes and maintenance
Partner network	Wolkat, grocery and clothing stores

Start-up 2: The Lease Business Model

At the core of the business model is circularity. Through its lease concept, customers can borrow a pair of jeans and, at the end of lease, can return it. Depending on their condition, the returned jeans are either upcycled or recycled into a new pair of jeans. Currently, the jeans consist of post-consumer recycled cotton and certified cotton. In addition to its lease model, Start-up 2 offers both a free repair service and vintage collection scheme of returned jeans of acceptable condition, thereby actively extending the life of its products.

Start-up 2 established as a counter movement on the degradation of the quality, the price, and the growth of fast fashion. Accordingly, the founder states “So I decided to do something about it, and took the biggest item - the jeans. Everybody has jeans and it’s also the most polluting item because from the cotton grounds to your closet everything goes wrong in a normal fashion company or in a normal jeans company. So that was our inspiration to take the big item and try to change it, to try to make every step better so the making of cotton and treatment of people. Which was also extreme was that we wanted to

be responsible for what we put into the market so the product we still wanted to own, and we wanted to have it back after its end-of-life or end-of-use. So that's in short why we started in that we want to make a circle round, we want to design things that can be recycled and reused internally."

The challenge that Start-up 2 faces is that "In order to make the circular economy an attractive proposition in fashion, recycled cotton would have to be cheaper than newly produced cotton, and not the other way around. However, this is not the case or rather, not yet. We take on the challenge. We want to be the pioneering brand showing the world that we can create a circular denim brand anyhow." (Start-up 2, Sustainability Report)

Table 5: Business Model of Start-up 2

Value proposition	High quality, sustainable, recycled, cleaned jeans, repair service, customer review, optional: buying a jeans, transparency and traceability, affordability
Communication channels	Webshop, newsletter, blog, social media, ambassador program, sustainability report, sustainable fashion course, knowledge hub
Revenue streams	Leasing assets, goods sales
Key resources	Logistics, cleaning and repair services, recycling facility, customer data
Partner network	Retailers, Manufacturers

Start-up 3: The Recycling Business Model (Clothing)

Start-up 3 offers 100% circular clothing deriving from both pre- and post-consumer textiles. These textiles are sorted by color and processed into fibers that are spun into new yarn and then woven into fabric. The production of clothes is connected to a circular clothes and fabric manufacturer in Etten-Leur, the Netherlands. To avoid leftover stocks and waste, Start-up 3 produces in small bulks or even produces items once an order has been made (made-to-order). Currently, a deposit system is being developed that allows customers to return their unwanted clothing once it has reached its end-of-life or end-of-use. This project is done in collaboration with a national operating washing service company.

Table 6: Business Model of Start-up 3

Value proposition	Recycled T Shirts, take-back option, circularity, sustainability
Communication channels	Webshop, social media
Revenue streams	Goods sales
Key resources	Recycling facility
Partner network	Retailers, Brands collaborations, Circularity b.v.

Start-up 4: The Recommerce Business Model

At the core of Start-up 4 is the resale and reuse of used clothing. Recently, the sale of used items and overstock products has quickly become the biggest and most relevant growth channel in e-commerce and retail. At the same time, recommerce helps to minimize the ecological impact of consumer goods through the significant extension of the life cycle of a product. and is a driver for customer loyalty. This model enables fashion brands and marketplaces to access the secondhand market for their own products through the Start-up 4's recommerce software platform. With that platform, fashion brands can build an integrated secondhand store in their existing sales channels. Aside from second hand items, returns and overstock products can also be processed. All technical and operational processes such as quality control, pricing and logistics are handled by Start-up 4.

With the concept of recommerce, Start-up 4 provides affordable, carefully checked secondhand clothing through a simple process. "One of the co-founders was always buying a specific pair of shoes that cost quite a lot, like 300 Euros. He couldn't afford them. So he was always looking for these shoes and other things on Vinted or ebay, but he was always struggling with the size, the communication with the seller was always too complicated. So they thought about how nice it would be if you just could go to Nike and choose your pair of shoes but already worn shoes (second-hand shoes) and you can already see if your size is available." (Start-up 4)

Table 7: Business Model of Start-up 4

Value proposition	Secondhand clothing, trustworthy, efficiency, sustainability, affordability
Communication channels	Webshop integration, social media
Revenue streams	Service sales
Key resources	Logistics, return/refurbishment/product data based management/fulfillment processes, IT services, customer data
Partner network	Clothing brands with webshops

Start-up 5: The Rental and Lending Business Model

With its peer-to-peer platform, Start-up 5 allows people to lend and rent their own wardrobe within a city. By following a city-based approach, the company aims to reduce transportation routes and connect the community. At the moment, the company operates in different major cities in Germany and Austria. Currently, a business-to-business model is being worked on, especially to support smaller and local brands.

The driver behind this concept is due to the fact that "on average, we buy 60% more clothes today than we did in 2000, but wear them for only half as long. These buying habits contribute to at least 39 million tons of post-consumer textile waste generated worldwide each year - mainly in the form of garments. There are enough clothes and accessories circulating, just waiting to bring you beautiful moments. Together, we combine consumption and sustainability and make fashion circular." (Start-up 5)

Table 8: Business Model of Start-up 5

Value proposition	High quality and designer fashion, personal styling, local networking, own income, inclusivity, accessibility, sustainability, circularity, insured and cleaned rental and leasing, customer review, affordability
Communication channels	Webshop, newsletter, blog, social media, pop-up stores, open panel talks
Revenue streams	Renting and leasing assets
Key resources	Logistics, cleaning and repair services, marketing, customer data, IT
Partner network	GreenCircle, RE-NT, cleaning and repair partners

Clearly, these start-ups have specialized in distinct circular business models. However, some have integrated multiple circular practices into their business model (Figure 9). While Start-up 2 has a leasing business model in place, it also offers the possibility to return unwanted jeans with a minimum of 90% cotton for subsequent recycling into a new pair of jeans. If jeans are in an acceptable condition, those are leased to another customer. If possible, broken jeans are refurbished. Thus, prolonging their use-life. Similarly, are leasing and refurbishment services offered by Start-up 5.

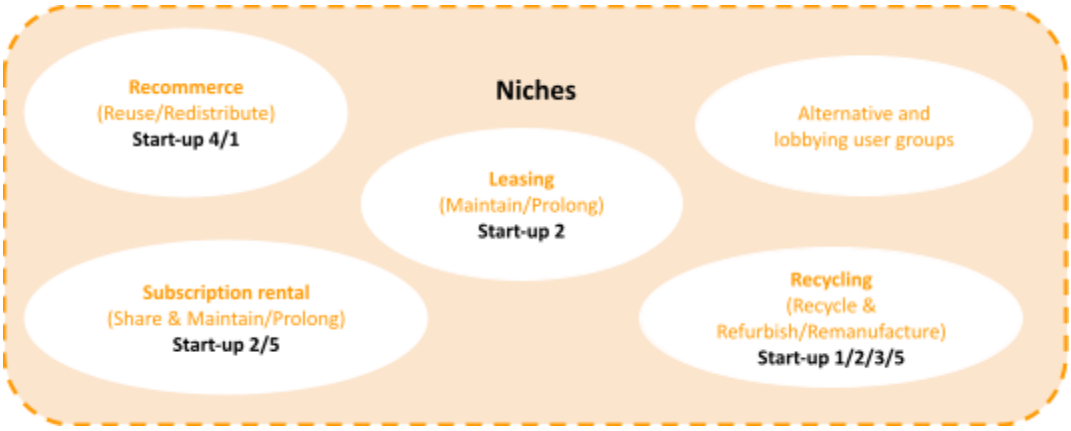


Figure 9: Extended conceptual framework - Niches

4.2 Linear unsustainable fashion regime

In order to identify needed changes to move towards a circular fashion system, the current dominant unsustainable fashion regime must be characterized. Based on the conceptual framework, properties related to market, policy, consumer, technology, and culture make up the regime. By reflecting on the regime, the characteristics causing it, and its transition dynamics helps in understanding why current interventions are too often not effectively contributing to the transition towards circular fashion.

USER & MARKET REGIME

Fast fashion companies

The ambition to transition towards a circular fashion economy is driven by the environmental and social problems related to the linear take-make-waste fashion industry. These range from noncompliance with labor standards and legislation, to pollution, high greenhouse gas emissions, and the failure to protect garment workers from the disastrous consequences of widespread retail closures, layoffs, factory shutdowns in the wake of the COVID-19 pandemic. In particular, start-ups often experience an obstacle caused by the unfair competition from low-priced fast fashion (Start-up 2, Start-up 4). Since the cost of environmental and social impact are not internalized, a competitive advantage for linear fashion products is created, thereby preventing a level playing field for sustainable alternatives (Buchel et al., 2018; Fashion For Change, 2021; Start-up 2). According to the Ellen MacArthur Foundation (2017), in particular fast fashion companies must undergo significant change in order for the whole regime to be transformed as those form a large part of the current fashion regime.

Lack of transparency and traceability in supply chains

In order for companies and brands to be held accountable for their impacts, transparency is essential. Without transparency and traceability, achieving a sustainable and circular fashion system is impossible. Generally, a lack of transparency and traceability persists in fashion supply chains (Buchel et al., 2018).

The demand for greater transparency and traceability in fashion supply chains has been growing for years, driven by the public outrage towards major disasters including the Rana Plaza building collapse in 2013. Back at the time, little public information was available about companies that were utilizing the factories. Brands themselves were unaware that their own labels were found on-site. This is explained by their extremely limited oversight of their suppliers and their subcontractors (Sharma & Kaps, 2021). For instance, one global fast fashion retailer works with around 750 suppliers that manufacture products for its eight global brands in around 1400 factories across 41 countries, which are sold in approximately 5000 stores in 75 markets, and across 52 markets via its online shop (Meier, 2021).

In response, various positive developments have emerged. A leading measure for transparency is the Transparency Index by the non-profit organization Fashion Revolution. Since its first index in 2016, the Fashion Transparency Index has driven positive change by encouraging brands and retailers to disclose (more) information on their public disclosure of human rights and environmental policies, practices and impacts, in their operations and in their supply chains. However, the 2021 Index found that progress on the transparency in fashion remains slow with brands achieving an average score of just 23% (Fashion Revolution, 2022).

To boost transparency in fashion supply chains, at the niche level, Düsseldorf-based start-up Retraced has built a modern all-in-one compliance, sustainability, and risk management solution. Through its platform, the Start-up aims to support brands and their value chain partners in driving data exchange, communication and collaborative action. On the blockchain-based platform, brands and suppliers are enabled to structure and streamline their supply chain traceability through cascade or bottom-up tracing, and retrieve the data needed to prove product and material provenance, and share those with their partners and customers.

The mission and success of Retraced is greatly fuelled by the upcoming German Supply Chain Act that embodies a legally binding and strict liability regime. Coming into force in January 2023, the Act concerns companies that source their product and services through supply chains from developing and emerging countries, and sell them in Germany. The Act's focal point is the obligation for companies to conduct human rights and environmental due diligence. The due diligence requires risk management, the obligation to remedy any identified human rights and environmental violations, grievance mechanism, and mandatory documentation and reporting. In case of non-compliance, companies face sanctions in the form of periodic penalty payments. The German Supply Chain Act is the first legislative step to manage and control German companies and the adverse impacts of their supply chains. Wider-reaching supply chain regulations are to be expected. The goal continues to be a uniform European-wide law with the German law serving as a blueprint (Sharma & Kaps, 2021).

Conservative financial market

For start-ups, the difficulty of finding finance relates to the creation of a clear value proposition, the lack of track records and the need for new financial products. A transition to a CE is only possible through changes on the side of circular businesses as well as the financial industry (Bauwens, et al., 2019; Kas et al., 2018).

Many start-ups struggle to develop a solid and viable business model. Thus a clear value proposition is crucial and must consider all dimensions of the triple bottom line (financial profits, environmental and social impacts) by taking up a full stakeholder network perspective instead of only focussing on the customer (Kas et al., 2018). Consistent with this observation, Start-up 1 noted that "start-ups need funding but they are too abstract. The ideas of start-ups are sometimes so abstract that investors do not really know what they are investing in. So, as a Start-up you need to make concrete ideas and plans, and concepts as well. To also get consumers to buy your product or service. So, that's important."

In most linear business models, costs are immediately covered by revenues from a sales transaction. This applies to more established companies. By comparison, circular models require more time to get off the ground and generate enough revenue, also to prove their business value and return on investment to investors. A more specific example, the product-as-a-service business model has a much different cash flow structure than the traditional business model. The shift from ownership to use directly affects both the cost structure of the company and the financing requirements. Occurring repair and maintenance costs during the use phase makes cost prediction very difficult, which in turn, creates uncertainties and risks, and makes the business model less attractive to investors (Bauwens et al., 2019). Instead, investors prefer proven, quickly scalable models that come with rapid return on investment (Fashion For Change, 2021; Kas et al., 2018; Lisca et al., 2021). The issue of a lacking or missing track record poses issues in finding clients as well. In the case of Start-up 4, a large company decided to not collaborate because of their lack of record. In the end, this company ended up working with another recommerce company that "wasn't as good as us, but was more established". The lack of a track record can be overcome through collaboration with well-known companies (Start-up 4).

The lack of access to finance was also dominantly perceived by all interviewed start-ups. Typically, investing in sustainability is considered as unprofitable or rather provides a very slow return on investment that contrasts with the desire of investors to generate quick returns and "hypergrowth" (Fashion For Change, 2021; Kas et al., 2018). Although investors are increasingly supporting and financing the CE (Start-up 1), actual investment is still limited because the majority remains hesitant and struggles with understanding and evaluating the business stance of a circular proposition (Start-up 1). Thus, different actors and forms of capital, for example governmental money (Start-up 5), will be needed to finance circular business models (Kas et al., 2018).

Investors do not solely commit capital but can also provide advice (Start-up 4). Due to his knowledge and working expertise in the secondhand field, Start-up 4's investor was able to advise the Start-up in fields where it was lacking sufficient knowledge and experience. Additionally, Start-up 4 emphasizes that

working with the right investors is crucial to overcome challenges that are faced by start-ups. Although both investors are not necessarily ESG nor sustainability conform minded, Start-up 4 realized through its conversations with them that both secondhand and recommerce are not purely sustainability topics anymore, rather have become interesting to the broad public, in other words, promoting sustainability is not possible without commercial interest.

In general, new entrants with their new innovative business models often struggle financially. Due to their unclear value proposition, finding and convincing potential investors poses a great challenge. Taking into account that there exists ambiguity in the value of a CE, this gap is further enlarged. Clearly, there is a need for new financial actors and financiers. By changing the way business models are assessed and by educating stakeholders on the long term benefits of a circular business strategy, start-ups can be helped.

Incumbents with circular practices

The fashion industry has embraced the concept of a CE. Fashion leaders have made bold commitments towards usage of recycled cotton, reduction of emissions, as well as transitioning towards more circular value cycles. There are various different circular business models such as rental, renewal, and upcycling that give consumers many routes to actively participate in the CE. Although most large companies follow a linear business model, some incumbents integrate circular practices into their business strategy. Some companies combine a traditional products sales model with new access-based models, such as lending or renting, in their value proposition portfolio. This allows them to differentiate between customer segments (Gillabel et al., 2021).

One prominent example is the H&M Group's efforts in becoming fully circular and by 2025 to design all its products for circularity using the Circulator. The tool helps designers through the product development process by asking for the product's purpose, which in turn, will guide decisions on which materials and design strategies are to be applied. By publicly sharing the Circulator, the H&M Group aims to help other designers and stakeholders of the fashion industry since it has realized that transitioning towards a circular fashion industry is not possible through stand-alone action (H&M Group, n.d.). Furthermore, across the H&M Group, customers are able to engage in access, use and care, and collection based business models. For instance, in the first case, customers can shop and sell second-hand clothing through Sellpy or can rent garments in selected stores. Furthermore, the H&M Group encourages its customers to extend the life of their garments through care and repair services. Lastly, stores offer in-store collections for post-consumer garments. With partners, these garments are subsequently sorted to be reworn, reused, and recycled (H&M Group, n.d.).

There are several driving forces for established companies in the fashion industry to explore circular business models. A common main motivator for companies to engage in the CE is to reduce the environmental impacts of textiles consumption as part of their corporate social responsibility policy. Other motivators are the creation of closed textile loops to ensure future raw material supply and reduce the pressure on virgin resources; profit-making opportunities; an aspiration to create a more sustainable

mindset including reduced consumption among their customers; the creation of green jobs; and responding to direct customer demand, for example for repair services (Gillabel et al., 2021). As Start-up 4 explains that fast fashion companies have approached them in two different ways: either multinational fast fashion companies that are interested in becoming more sustainable have requested a partnership, or were interested in their innovation itself only. The problem related to the former is that Start-up 4 is only Germany based and small which cannot keep up with the volume of clothing of a multinational company.

At present, many established companies do not engage in sustainable or circular strategies, and completely ignore developments around them because they are still motivated by profit and little costs (Start-up 2; Start-up 3). However, they implement more or less sustainable practices into their business model upon consumer pressures or governmental regulations, but not due to genuineness (Start-up 2). Incumbents are aware of circularity and circular practices, but choose the cheapest production practices, materials and facilities (Start-up 3). Based on these observations, a clear response of the fast fashion brands to circular and sustainable business model innovations in the niche level can not be concluded. However, commonly adopted practices by incumbents are secondhand, repair, and rental.

POLICY REGIME

Weak and obstructing regulation

The fashion industry operates within an unregulated ecosystem where negative externalities can be produced freely, and production takes place mostly in developing countries, and transparency is avoided (Buchel et al., 2018; Fashion For Change, 2021). There is an issue of existing legislation and policy instruments that hamper circularity. Across Europe, many self-organized informal networks aiming for a CE have developed due to weak and unclear regulation concerning residues and waste. A specific example is given by Henry et al. (2020) of the German market where resources that have been declared as waste cannot be reused. Instead, they must be eliminated or need specific processing licenses. However, the tax for such a license is regarded as too high.

Another case is presented by Start-up 5 about regulations that prohibit and limit supply chain collaboration. For example, based on the German competition law “a supplier would get a request from a bigger company and would have to supply this and that. But you cannot do that. Or you want to change something as a supplier but you don’t have the power because you are just one of the many suppliers. So what you could do, from a human perspective, is build a group of suppliers in order to put more pressure on the company that you are supplying, but that’s not allowed.” On the other hand, even with the introduction of new and binding regulations, companies will find a loophole to avoid their obligations in order to save costs and increase their profits (Start-up 3; Start-up 4).

Expensive certifications and greenwashing

In a highly competitive market with increasing greenwashing practices, eco-labels and certifications are essential in demonstrating authenticity, credibility and transparency in order to gain the trust of consumers and attract investors. Although such policy instruments aim to promote sustainability, they can act as regulatory barriers. Often start-ups lack financial means to obtain them. This dilemma reflects the classic "chicken-and-egg" problem where start-ups need funds from investors to obtain certifications and labels, but need those in order to gain investors (Fashion For Change, 2021).

In response to this problem, many start-ups invest heavily in good marketing and communication measures, especially via social media in order to gain visibility and build trust (Fashion For Change, 2021). The importance of marketing and social media was highlighted by Start-up 3: "We collaborated with a sustainable minded influencer with a broad community that already have a sustainable mindset and are open, and collaboration with influencers that are not related to sustainability in any way, but provide a wide audience. So marketing is key in growing any company". Collaboration with so-called influencers on social media is also undertaken by Incumbent 1. Furthermore, Start-up 3 added that "As a start-up you have to be patient, because people don't know about you, this is why marketing is so important, without marketing growth is impossible."

In the fashion industry, the common practice of greenwashing constitutes a widespread and serious problem (Circular Berlin, 2019; Mizrachi & Tal, 2022; Fashion For Change, 2021). With false green claims, brands greatly affect the willingness of consumers to consume sustainable and circular fashion (Mizrachi & Tal, 2022). The issue of greenwashing has been expressed by all interviewees. In particular, Start-up 2 views greenwashing as the biggest challenge to overcome: "We stopped working with Zalando because of greenwashing. If we are featured on Zalando and they put this green dot on our jeans, but if you do research, all jeans companies have a green dot. So how can a consumer tell the difference between our jeans and dirty ones?" The narrative of circularity and sustainability is mostly used and seen as a new profit pool attracting consumers (Start-up 5).

With the distribution of misinformation, there is a lack of adequate knowledge. To demystify all false and misleading information and confusion, the European Initiative on substantiating green claims using product and organization environmental footprint methods seeks to deliver reliable, comparable, and verifiable product information (Start-up 2).

Circular regulations and governmental support

There are governmental policies and regulations that can hamper the transition towards a circular fashion industry (Bauwens et al., 2019; Kas et al., 2018). In fact, regulatory procedures are considered as one of the biggest hindrances for a transition towards a CE. As current standards and regulatory frameworks are designed for linear production and consumption models, a complete revision and rewrite of regulations to align and integrate different policy strategies is suggested (Fashion For Change,

2021; Kas et al., 2018). For example, there is a great focus on reusing and recycling products and materials, but less on material quality. Other barriers relate to a lack of governmental funding for circular initiatives and businesses, a lack of interest by and communication among governmental bodies, and a lack of legal obligations in participation in circular agreements (Kas et al., 2018).

Within the European Union, the regulatory landscape is increasingly shifting to encourage companies to invest in circularity. The recently launched EU Strategy for Sustainable and Circular Textiles sets design requirements for textiles to make them last longer, easier to repair and recycle, as well as requirements on a minimum recycled content to be included, so that "by 2030 textile products placed on the EU market are long-lived and recyclable, to a great extent made of recycled fibers, free of hazardous substances and produced in respect of social rights and the environment" (European Commission, 2022, p.3). Proposed key actions include the introduction of mandatory ecodesign requirements, the termination of the destruction of unsold and returned textiles, the prevention and reduction of microplastics pollution that mostly originates from fast fashion, the introduction of digital product passports, the revision of ecolabel criteria, and the boosting of extended producer responsibility schemes and textile waste recycling and reuse (European Commission, 2022).

At a national level, the German government plans to fully transition to a CE by 2030 in order to completely decouple economic growth from resource consumption. To start the transition, the Circular Economy Roadmap was formulated, however, it does not contain explicit strategies for individual sectors, such as the fashion industry, but recognizes an integrated approach to value creation as a potential solution to achieve a CE. The approach is composed of four perspectives with the business model perspective emphasizing the need for a proactive approach by businesses and the establishment of innovation spaces for research and development of new business models (Circular Economy Initiative Deutschland, 2021).

At a national level, for the Dutch government, the concept of a CE is gaining traction. The Dutch government has set a target of achieving a fully CE by 2050. Under the Circular Economy Implementation Programme efforts are being made through five transitional agendas, inter alia, consumer goods such as clothing. Furthermore, the programme includes ten cross-cutting themes that take into account, for instance, the introduction of market incentives for sustainable manufacturing and consumption. Highly relevant for circular businesses is the Circular Economy Accelerator portal that aims to support businesses with their circular ideas and advise them in knowledge, network partners, legislation and financing related questions (Government of the Netherlands, n.d.)

A rather recent regulatory effort to support the transition to a CE was the renewal of the goals of the UN Fashion Industry Charter for Climate Action at the UN Climate Conference COP26 in Glasgow, United Kingdom last year. The charter contains the vision to drive the fashion industry to net-zero emissions by 2050. The signatories, namely Adidas and Hugo Boss, collectively commit to various actions on climate change to, inter alia, *"establish a dialogue with governments in key countries to enable renewable energy, energy efficiency and the necessary infrastructure for a systemic change beyond the fashion industry"* (United Nations, n.d.). Working groups have been formed to develop mechanisms by

identifying best practices and supporting current efforts, highlighting and bridging gaps, and strengthening collaboration among stakeholders through knowledge and resource sharing (United Nations, n.d.). Here, the role of the government is to bring together the whole industry so that the industry can show its voice (DHL, 2022).

A particular example of how legal regulations, and thus governments and policymakers can directly steer the transition, is provided by Start-up 4. Just recently, the European Union has ordered a law requiring take back systems to become mandatory. By coming into force in 2024, there will be the possibility for companies to buy back their products through a system that Start-up 4 is currently offering. That way, fashion companies and brands have to revise their complete planning and production cycles in order to offer high quality and durable products (Start-up 3).

TECHNOLOGICAL REGIME

Underdeveloped textile collection and sorting infrastructure

By heavily relying on virgin and non-renewable fossil resources, the prevailing fashion regime is highly extractive (Buchel et al., 2018). The fashion regime is characterized by mature production technologies and linear production processes. Most unsold and unwanted clothing ends up in landfill or incineration, while less than 1% of clothes is recycled (Start-up 1; Incumbent 1; Ellen MacArthur Foundation, 2015), before being incinerated or landfilled (Buchel et al., 2018) or dumped in lower-income countries (Lisca et al., 2021). There is an overall insufficiency in both the collection and sorting of textiles.

As textiles come from various dispersed sources (challenging the collection) and are largely made from material blends (challenging the sorting), developing an adequate infrastructure for post-consumer textiles is greatly hampered (Lisca et al, 2021; Zalando, 2021). Furthermore, in many European countries, reliable data on the amount of collected textiles is practically nonexistent. Instead, export statistics are used as proxies. This is due to the fact that standards for collection are less established, thus leaving it open to the collectors to what degree collected materials need to be separated for further processing (Lisca et al., 2021; Hemkhaus et al., 2019).

As sufficient information on textile collection lacks, reliable data for and from sorting is missing in turn. Currently, textiles are sorted mostly manually. With often inaccurate labels, textiles sorting becomes very costly, prone to errors, and lacks quality assurance. Consequently, sorting leads to cost ineffective down-cycling and, in general, is difficult to scale (Lisca et al., 2021; Hemkhaus et al., 2019).

The post-consumer textile collection plays an essential part in establishing a CE. Its success heavily depends on the behavior of consumers and citizens. With respect to donating used items for reuse, consumers are often reluctant to donate because there is a lack of transparency about what happens to the clothing they have donated (Gillabel et al., 2021). Thus, collection points present a convenient

alternative. Such installments in the form of machines are provided by the Dutch start-up Drop & Loop. Together with its textile recycling partner Wolkat, the collected items are sorted and depending on their condition, are then sold or processed into yarn, which is then used to make new fabrics. Even zippers and buttons are reused. The idea behind Drop & Loop helps consumers in disposing of their unwanted clothing and textiles in an appropriate manner - regardless of their condition or brand, and are rewarded by a discount voucher. Hence, convenient collection schemes, as provided by Drop & Loop, can encourage consumers to hand over their waste textiles. To improve textile collection rates, the Netherlands has announced the introduction of such producer responsibility for all manufacturers and importers that market clothing in the Dutch market. Under such a scheme, these parties are responsible for the collection, recycling and resume and waste phase of their products. The extended producer responsibility is expected to come into force in January 2023 (Netherlands Enterprise Agency, n.d.).

Inadequate recycling infrastructure and immature recycling technology

Closely related to this issue, a barrier for start-ups to thrive is posed by the lack of high-quality recycled textiles as a result from lacking circular design standards, unprofitable and inadequate recycling infrastructure (Incumbent 1), and low production costs of primary products (Fashion For Change, 2021; Hemkhaus et al., 2019; UNECE, 2022; CBI Ministry of Foreign Affairs, 2022). Currently, only less than 1% is recycled (Start-up 4; Incumbent 1; Zalando, 2021). Considering the total production volume of the fashion industry that is dominantly driven by the fast fashion industry, Incumbent 1 doubts that there are recycling companies with the capacity to handle such high volumes. In addition, the recycling of complex fiber-based products must be profitable, however, this is not the case. As long as the infrastructure is inadequate, the problem of circulating the product back into the system after use remains. This will obstruct the transition towards circularity. As Incumbent 1 states “current business models and products in any industry can become circular, but the industry itself is not circular.”

Most clothes are not designed for circularity and often fail to take into account how the use life of a product can be extended, and how materials can be looped back. Despite being interested in circularity, designers often do not have enough information to effectively implement in their work. With limited indicators around circular product and process design, it is challenging to make informed operational decisions to maximize value and circularity simultaneously. Companies also tend to treat circularity design and material innovations as proprietary knowledge, and are reluctant to share openly. Finally, there are often gaps in connecting complementary research, which inhibits and slows innovation (Lisca et al., 2021). Consequently, clothes can not be disassembled and recycled in an economically viable way (Fashion For Change, 2021). Considering these requirements into textile design require investment, new collaborations, and higher costs, which are currently not rewarded by the market such as by tax incentives. Thus, an effective incentive mechanism for companies to initiate circular designs must be enforced (Lisca et al., 2021). Furthermore, post-consumer textiles often do not meet the quality standards for recycling. Even if they do, the price of new garments is high due to high manufacturing costs, and thus less scalable (Fashion For Change, 2021; Lisca et al., 2021).

Closely related to this issue is the high price sensitivity for raw material inputs. As the extraction of fibers and other raw materials takes place at the beginning of the supply and value chain, a small price fluctuation between virgin and recycled fibers poses a significant barrier for brands to source recycled fibers. Currently, recycled cotton is more expensive than virgin cotton (Start-up 2). In addition, with the majority of consumers not willing to pay a premium for sustainability, the relatively higher price for recycled fibers results in low market demand. This discourages further recycling from scaling-up (Lisca et al., 2021), and thereby impedes moving towards safe, recycled or renewable inputs.

Another challenge to increasing recycling is the large proportion of clothing made from materials blends such as cotton and polyester, which makes their separation difficult (Lisca et al., 2021; Zalando, 2021). To date, separation remains technically challenging, highly energy intensive, and expensive (Lisca et al., 2021). Additionally, circular fashion economy is problematic due to the quality and material loss of cotton fibers during the mechanical recycling process (Zalando, 2021; Mishra et al., 2020; Lisca et al., 2021). In comparison, chemical recycling promises virgin-quality fibers output but is highly energy intensive. Tying in with the uncertain policy direction, investment in research and development and scaled facilities are discouraged keeping chemical recycling at low technical and financial maturity (Lisca et al., 2021, Fashion For Change, 2021).

Undoubtedly, separate collection is a prerequisite for reuse and recycling. The higher the quantities and quality of separately collected waste streams, the better they can be recycled, repaired and reused. However, at the moment, textile recycling's potential is still not fully realized due to a lack of proper technology, particularly when it comes to sorting the collected clothing, separating blended fibers, and separating those from chemicals. The full recycling of clothes into new fibers is still far from commercially viable (CBI Ministry of Foreign Affairs, 2022). For the fashion industry to become circular, not only supply chains but the complete infrastructure around collection, sorting and recycling must be transformed, made transparent, traceable, and circular. Optimally, fashion companies may adopt new practices that integrate life-extending practices into their business models by offering reuse, repair, resale or rental options (Rory Hugill, Fashion For Good; Mishra et al., 2020). However, positive developments in research and development as well as pilot ventures are making tremendous improvement, and partly have achieved maturity at scale (Amed et al., 2022).

SOCIO - CULTURAL REGIME

Disposable and consumerist society

The demand for consumption, including clothing, has increased through demographic developments such as population growth and increasing global wealth. Today, clothing has exceeded its function as a basic need. The dominant fashion regime has developed into a sector that is heavily built on the assumption of infinite growth, with an increased production of items sold in response to a continuously growing demand at low prices (Buchel et al., 2018; Circular Berlin, 2019). Such consumption behavior

drives impulsive purchasing decisions of mostly low-quality products rather than longevity and durability (Buchel et al., 2018; Lisca et al., 2021). According to the Ellen MacArthur Foundation (2017), more than half of produced fast fashion is disposed of in less than a year. Clearly, the fashion industry is disposable where consumers demand quantity and affordability, but dispose of clothing quickly (Buchel et al., 2018; Lisca et al., 2021).

Lack of consumer awareness

Consumers are recognized to be one of the most significant, prevailing organizational barriers to a sustainable and circular fashion industry (Mizrachi & Tal, 2022). Promoting circular fashion requires the integration of consumers. While increasing numbers of consumers, who are motivated by the values of environmental and ethical consumerism, can be observed, a change in consumption behavior is much less visible. Clearly, there exists a considerable gap between sustainability intentions and behavior (Hemkhaus et al., 2019). Furthermore, consumers fail to optimally utilize their clothing and thus, exhibit wasteful patterns of usage. This is directed to a low awareness about the after use phase, where to bring clothes, and lack of information for consumers where clothing donations are possible (Circular Berlin, 2019). In general, many consumers lack profound knowledge about the CE and its benefits, and in general about sustainability (Start-up 3; Start-up 5).

According to Start-up 2, unsustainable fashion is an issue that is driven by a majority of "lazy" consumers that do not intend to change. On the other hand, Start-up 2 has observed that "consumers today are very critical" which is a positive implication on behavioral change. However, Start-up 5 stressed that it is very difficult to change people's behavior as it is complex. Accordingly, Incumbent 1 has observed increasing consumer awareness and questions about its sustainable collection, "but they do not ask in-depth questions".

All interviewed stakeholders have commonly expressed that reaching consumers poses a great barrier in transitioning to a circular fashion industry. The lack of awareness stems from the fact that a circular product or service is perceived insufficiently valuable, and that the business model is not feasible. Even scale-ups encounter these recurring barriers (Kas et al., 2018). Additionally, the chances of changing consumer awareness and purchasing preferences are weakened further by deep behavioral lock-in in linear consumption patterns and lifestyles (Fashion For Change, 2021).

In order to successfully convince consumers, a circular product or service must be better or easier to use than a linear alternative. This is further aggravated with the negative connotation of the term waste and its association with low quality. Although the sharing economy seems to work for certain products and services, consumers may be reluctant to share their clothes (Bauwens et al., 2019). Even if consumers are willing to invest effort and time in consuming more circular or sustainable products, the concepts of CE and sustainability are victim to greenwashing. This poses another barrier to effectively communicate with consumers. Not only consumers, but also the government and financial actors tend to trust and commit to new products and models when they see them working. Compared to linear business models,

circular business models are still much contested as there are not enough successful circular business cases. This especially applies to start-ups with their innovative business models in their pilot phases that lack past experience (Kas et al., 2018).

Although awareness is rapidly increasing, the price and quality continue to be the most commonly considered factors when consumers make a purchasing decision. If a more sustainable product or business model has higher price points or requires extra efforts, such as returning items, market adoption is likely to be limited. Additional value to consumers are brought by circular models in new ways, such as a variety of clothing, but these elements are often overlooked or undervalued (Lisca et al., 2021). Start-up 5 doubts that sustainability is the most important purchasing decision driver, rather "sustainability is a motivation, but I don't think that people really rent because of that. Not yet. I would say that most of the people come to us because they think it's cool and sexy. And I think this is what actually attracts people."

In order to attract and engage with an even wider audience, Start-up 5 is concentrating on other values aside from sustainability and circularity : "Besides that [sustainability and circularity], the brand that we have built talks about diversity, individuality, and inclusiveness. This is also what attracts people. They see that we are a future-forward company. We are not just trying to fit into the current narrative of being sustainable and circular. But also to educate and shape the future when it comes to how we see fashion." From a target group perspective, Start-up 5 focuses on approaching and being visible to people who are not necessarily interested in rental and sustainability, and needs to be convinced. Through panels, topics such as fashion, inclusivity, accessibility, sustainability and circularity, and technical innovations are discussed. Other engaging and educational strategies include student and ambassador programs (Start-up 2), on-site visits and tours (Start-up 1; Start-up 3; Start-up 4), and material and care guides (Incumbent 1).

Increasing pressure from society

Particularly, fast fashion has sparked criticism for its environmental impact and poor, unethical labor working conditions. This public attention places the issues of the fashion industry center stage, and creates pressure for change (Buchel et al., 2018). Indeed, positive change in the mind of consumers is observable. Start-up 2 recognizes the increasing number of consumers being more critical and showing genuine interest in social and environmental injustices, by stating that "Other consumers want to know what is really behind this brand and don't believe these false promises. There are consumers that do good research and go to workshops and ask questions. But not everyone does that." Accordingly, it is predicted that in the near future an increasing number of consumers is likely to invest in more high-quality and versatile clothing but a significant number of consumers will still engage in impulsive purchases of fast fashion pieces (Amed et al., 2022). However, it can be stated that the growing public attention places the issues of the fashion industry center stage, and creates pressure for change. This can be seen in the emergence of movements such as lowsumerism and slow fashion that oppose the linear fast fashion paradigm.

A remarkable example of the power of public pressure and movement is illustrated by the petition 'FairByLaw' by Lisa Jaspers, the founder of fair-fashion label Folkdays. With the support of Fashion Changers, the petition greatly contributed to the implementation of German Supply Chain Due Diligence Law (Industry expert 1).

Overall, identified regime barriers and opportunities overlap mostly with those presented in the theoretical framework. First, while an increased sustainable awareness is observable, it does not necessarily result in a rising demand for circular products/services, or the demand is not driven by sustainability, but other values (Start-up 5). As consumer behavior is highly rigid, changing their behavior takes time, and there is a high possibility that consumers bounce back to old patterns as observed in the example of the pandemic once it slowed down (Start-up 5; Incumbent 1). Second, at the policy level, governmental efforts are seen in the formulation, implementation, piloting of new and revised environmental legislations. However, not all cover the fashion industry specifically, some block circular efforts (Start-up 4), and are circumvented (Start-up 5). In general, the government is expected to do much more (Start-up 2; Start-up 3; Start-up 4; Start-up 5; Start-up 6; Incumbent 1). Third, circular and established manufacturers/recycling facilities exist, such as Wolkat and Circularity b.v., but represent the minority (Start-up 1; Start-up 2; Incumbent 1). Still, recycling technologies are considered inappropriate and come with significant disadvantages. There is room for research and development. Fourth, although numerous circular business model innovations exist, the market itself is not circular. Instead, it is strongly competitive with a deeply embedded traditional linear business thinking (Start-up 5; Incumbent 1). Lastly, financial support is limited and financial actors are hesitant due to uncertain profit and return. Circular business models necessitate higher capital investments and different money flow (Start-up 1; Start-up 5; Industry expert 1).

4.3 Landscape developments

The fashion regime does not operate in isolation. The system is subjected to global and autonomous developments and trends that either reinforce the lock-in of the system or challenge it by offering opportunities for transformation, and thus provide the foundation for transition pathways. According to the theoretical framework, such developments are subjected to demographic trends, political ideologies, societal values, and macroeconomic patterns. However, through empirical findings, more specific developments have been identified, inter alia, the COVID-19 pandemic and digitalization. This chapter addresses these more general landscape changes and pressures that still pose a significant influence on circular business model innovations and the existing fashion regime, and thereby its transition as well.

INSTITUTIONAL & POLITICAL TRENDS

Changing mindset of governments

The increasing global urgency to deal with environmental issues and climate change linked to the modes of fashion production is pushing governments to take measures that limit greenhouse gas emissions, resource depletion and pollution, and implement strict environmental regulations, including policies and frameworks that integrate measures to support a circular fashion transition. While the broad EU Circular Economy Action Plan acknowledges CE principles to be applied to textile manufacturing, consumption and waste management, acupuncture interventions such as extended producer responsibility schemes have been implemented by some countries. That way, brands and retailers take on responsibility for their own post-consumer waste and require financial contributions from producers for the collection, recycling and reuse (Amed et al., 2022).

The numerous policy developments at the policy level that envision a general CE, and specifically a circular fashion future as centerpiece, reflects a change in the mindset of government. Indeed, translating the key principles of the CE into practice requires new mindsets (beliefs and attitude) among politicians and public servants. For example, to translate the principle of recycling into action, a mindset change is required among public servants and society to accept waste as a resource and manage its collection.

Yet, more can be done to catalyze circular economies across government. Moving from a linear to a circular economy requires transformative approaches in public administration. Given the broad scope of a CE, it is clear that in order to achieve results and promote effectiveness and accountability, public servants will need to acquire new mindsets, capacities and competencies. Nevertheless, by adopting a CE mindset, federal agencies can create and achieve more value from their systems while simultaneously working toward a more sustainable and resilient future.

Russia-Ukraine war

Just when some of the supply chain challenges seen since the beginning of the pandemic appeared to be starting to fade, the Russian-Ukrainian war has created a new negative global supply shock. Since the onset of the war, prices of many of these commodities have jumped substantially. In addition, related sanctions are further intensifying disruptions on a global scale (OECD, 2022). These sanctions, however, put many companies in the textile and clothing industry at risk of terminating production if energy and gas prices continue to rise (The European Apparel and Textile Confederation, 2022). As textile fibers derived from oil, like polyester, are subject to significant price pressure, this can be seen as an opportunity for more sustainable and circular practices in the fashion industry (Industry expert 1). More natural fibers may be demanded as a response to increasing prices of man-made fibers. With the cotton market facing short supply and high prices, fashion brands and manufacturers have to consider

alternative materials (such as natural fibers) (Start-up 2) and production practices such as localization, recycling, and reusing products, components, and materials, thereby supporting the transition towards sustainable circularity. However, the shift concerning cotton, gas, and electricity prices can also pose adverse consequences. Increased material and production costs mean an increase in the price of end-products born by the consumer (Incumbent 1; Start-up 3). As products may not sell, companies use low quality natural fibers which in return will end up in a low-quality item (Incumbent 1).

ECONOMIC TRENDS

Covid-19 pandemic

Since its recent onset, researchers have increasingly begun to investigate the impact of the Covid-19 outbreak on sustainability. The pandemic offers a unique opportunity to analyze in real time the effects of a massive landscape shock on transition trajectories. The pandemic can be conceptualized as a major macroeconomic force which incorporates suddenness and longevity in shaping the trajectory of the fashion industry's transition towards sustainability and circularity.

The impact and role of the pandemic on the transition and on their own businesses conveyed rather disparate opinions among the interviewees. The pandemic is seen as a twofold opportunity with making people more reachable online (Start-up 1; Start-up 2; Start-up 3; Start-up 5; Start-up 6) and making them rethink about "life, health, and consumption" (Start-up 3).

Many interviewees highlighted the increased importance of e-commerce during the pandemic. By working solely with e-commerce companies, Start-up 4 greatly benefited from the closure of stores. However, the motivation of those companies to engage in recommerce is that it offers another pool of revenue (Start-up 4). In comparison, being a small company without strong financial foundations, Start-up 2 saw the pandemic as a serious threat to its business survival. However, due to its online presence, it experienced a doubling in turnover. An interesting case is Start-up 5 which was founded when the pandemic hit globally. With the mission to tackle overconsumption, the outbreak of the pandemic slowed down both production and consumption practices, thus the problem became less apparent: "The first challenge was that - so I was very excited to start my own business where I wanted to solve a problem - the problem of overconsumption. But with stores closed down, people could not go anywhere to buy clothes. So the problem wasn't there anymore. People were at home. So the problem that I wanted to solve wasn't there at that moment. Like, it wasn't present. Of course it was still there but overconsumption wasn't perceived as a big problem." For a very long time, people were exposed to a flood of media news related to the pandemic every day. The world's collective attention was being paid to the pandemic, thereby pushing other issues, including overconsumption, into the background (Start-up 5).

With hindsight, the pandemic partly turned out to be an opportunity for start-ups to push their sustainable and circular business ideas in response to the increased sustainable awareness of consumers. Additionally, it gave start-ups to focus and optimize their business model, and revise their values (Start-up 5). Nevertheless, some start-ups experienced difficulties during the pandemic. Generally, in the long term, such adaptations and investments can strengthen the fashion industry's and society's resilience regarding geo-political and economic shocks, but also hold the potential to steer the market towards sustainability and circularity.

SOCIAL & DEMOGRAPHIC TRENDS

Digitalization and Social media

In today's digital era, social media has become an integral part of society. It can be said with certainty that the fashion industry has drawn great benefits from using social media as a communication, interaction, and marketing platform to promote their products in front of a wide audience. The pandemic causing lockdowns and physical stores to close, people have spent more time online. An impressive 74% of consumers have stated that they are now more actively shopping via social media compared to prior to the pandemic, with clothing being one of the product categories that is shopped most (Amed et al., 2022).

Within the context of sustainable fashion, with consumers now paying more attention to environmental and social concerns, many brands use social media to capture consumers' interests while promoting their sustainability goals. Young consumers are more aware of sustainability issues than older consumers simply due to their engagement in social media where they are exposed to a variety of information (Amed et al., 2022; Start-up 3).

However, aside from acting as a channel for meaningful environmental education and communication, social media can favor greenwashing practices and can encourage consumers to purchase unnecessary products, irrespective of sustainable claimed fashion. Good marketing and social media tempt individuals to consume more clothes. In particular, the fast fashion industry is known to engage in such malpractice and to mislead individuals, making it difficult for consumers to distinguish truly sustainable from regular products and trick them into evaluating fast fashion brands as sustainable (Start-up 2).

Identified negative and positive landscape developments partly overlap with those presented in the theoretical framework. First, in general, there is an increased public and governmental awareness and action. Especially, the pandemic has rolled out increased environmental and sustainable incentives. Simultaneously, it has triggered the popularity and increased role of E-commerce, and thus digitalization. The growing importance of social media and digitalization offer inspiration for niche developments, creating new interactive platforms for communication and interaction between consumers and businesses. Especially the younger generation presents a promising target audience that is easily

reachable through social media and online platforms, and thereby enables competition between young and established businesses. Here, start-ups can benefit from the new demands and online practices of young consumers, thereby competing with the present regime.

Chapter 5 - Analytical Findings and Solutions

In Chapter 4, the dominant unsustainable fashion regime and the general landscape developments that either strengthen or destabilize the regime have been thoroughly described. It also revealed that shifts must take place in the market, policy, technological, and cultural regimes. By examining these barriers and their relation, important insights regarding the root causes of possible failure, and conditions and mechanisms of the current economy can be revealed. Once these realities are identified, targeted interventions can be undertaken in favor of start-ups. Thus, this chapter puts an analytical lense on the empirical findings and presents key findings on the most important barriers and opportunities. Subsequently, actors and resources needed to tackle these barriers in order to unlock the transformative power of start-ups will be addressed. To summarize, this chapter addresses the following questions: **Which specific properties prevailing in the user and market, policy, technological, and socio-cultural regimes hinder the transition process and directly affect the success of start-ups? Which actors and resources do start-ups require to overcome internal and external regime-related barriers?**

In regards to the **market regime**, the main barrier is the lack of economic viability of circular business models as these models often require high upfront investment costs with uncertain return and profit. Thus, there is limited funding for businesses, including start-ups. The missing track record and a lack of successful business cases further complicate the possibility for start-ups to convince financers.

To overcome this barrier, the involvement of financial actors is needed. Particularly, bank institutions play a vital role, as they can support in unlocking finance for new business models and engage in new value propositions with their clients. For instance, ABN AMRO, ING and Rabobank, and the Ellen MacArthur Foundation launched the Circular Economy Finance Guidelines aiming to promote and develop the role finance can play in the circular transition. This joint framework is composed of four core segments: investment use, project evaluations and selection, investment management, and reporting. With the publication of these guidelines, these banks aim to encourage other financial institutions to follow suit and stimulate the development of common understanding of the financial aspect of the CE at the European level (Raes et al., 2018). Another influential actor is the government. To make circular business models economically viable, governments need and hold the power to assess policy options such as tax reductions for companies with sharing, repair, and secondhand business models (De Schoenmakere et al., 2019), or VAT reductions that encourage resource efficiency (Ten Wolde & Korneeva, 2019). At the same, to create a level playing field and an easier access to financing for circular business models, financial institutions and governments can formulate accounting and financing models (Lisca et al., 2021). Regarding resource mobilization, new funding mechanisms are needed.

Experimentation in this field can be observed such as in the example of blended finance instruments that combine public, private and philanthropic capital, and financial solutions (Lisca et al., 2021; Blomsma et al., 2022).

In regards to the **policy regime**, the main barrier is the lack of policies supporting a circular transition. Instead, obstructing laws and regulations exist which, inter alia, declare resources as waste and prohibit their further usage, and expensive certifications. However, at the legislative level, there is an increasing focus on repair-friendly laws to extend the lifespan of products. In March 2021, "Right to repair" regulations came into effect as part of the EU's Circular Economy Action Plan. The regulations require manufacturers to provide spare parts and repair documentation (Holm et al., 2021). These requirements could be extended to clothing and textiles. Generally, the government holds the power to exert pressure on the regime through financial instruments and regulations, but can directly stimulate innovations through governance policies such as subsidies for experimentation and network management (Start-up 2, Start-up 4, Incumbent 1). Furthermore, the government could be more engaged in the scientific research to collect reliable data on garment life cycles, as currently research is done by the industry itself and private institutions (Industry expert 1).

In regards to the **technological regime**, the main barrier is the lack of proven technologies to implement circularity. Currently, recycling, collection and sorting technologies and infrastructures are inadequate and need restructuring. As recycling is highly costly, it is not practiced at scale. In order to make textiles recycling scalable, recycled fibers must be competitive with virgin fibers on multiple levels including quality, safety, price and supply capacity. In particular, governments, researchers, and financers play a critical role. Researchers and financers can work together in developing cost-effective textile sorting, collection and recycling strategies, while governments can evaluate policy instruments, such as extended producer responsibility schemes and tax benefits for producing/sourcing recycled fibers to make the recycling market competitive and, thus potentially scalable (Lisca et al., 2021).

A promising ambition is ReHubs, a joint initiative for industrial upcycling of textile waste streams and circular materials. As described previously, there are not viable reuse solutions and alternatives to incineration or landfill for non-collected textile waste. With the new EU waste legislation, coming into force by the end of 2024, this shall change. In response, the European Apparel and Textile Confederation proposes the introduction of five European Textile Recycling Hubs (ReHubs) that will be *"serving the whole Europe, for upcycling waste and circular materials by collecting, sorting, processing, and recycling industrial, pre-consumer and post-consumer textile wastes."* (EURATEX, 2020, p.5). Although these hubs will be located in Belgium, Finland, Germany, Italy, and Spain, their capacity will benefit other European countries and create an overall new European market of secondary raw materials. Through collaborative efforts, knowledge on product recyclability and design, recycling technologies can be generated and overcome R&D gaps. The development of the ReHubs is an opportunity for Europe to bring together *"several players from within the textile value chain and beyond, including technology providers and textile machine manufacturers, end-of-life textile collectors, sorters, operators developing primary processing and automized sorting, mechanical and chemical recyclers, companies utilizing final products, charity organizations and municipalities."* (EURATEX, 2020, p. 7).

In regards to the **socio-cultural regime**, the main barrier is the lack of awareness and willingness to engage with circular production and consumption by companies and consumers. This lack stems from the limited willingness to collaborate and share knowledge due to competition, and the profound lack of consumer awareness, knowledge and interest. In particular, collaborations across industry players is regarded as a fundamental factor in unlocking the promise of circularity (all interviewees; Fashion For Change, 2021). During the collaboration process with multiple stakeholders, a fashion company can acquire experience in describing and designing product specifications for closing cycles and augmenting the efficient use of resources in the entire fashion value chain (Fashion For Change, 2021). In fact, some of the start-ups engaged in the past and will participate in future collaborations and partnerships with incumbent and well-known fashion brands (Start-up 2; Start-up 3; Start-up 5).

However, as the value of circular business models is unclear, and thus unattractive, supply chain actors and companies avoid sharing information and collaboration (Kas et al., 2018). Clearly, there is an urgent need for integrated communities that provide access to information, contacts and other valuable resources to facilitate capacity building and collaboration. This is related to the fact that trust is regarded as the underlying basis for start-ups to accept and work together with partners in a supply chain. As innovative start-ups tend to challenge the conventional ways of conducting business, building trust through personal contact, close communication and transparency is paramount. While established companies get an opportunity to learn about innovative products and services and how to embrace them, start-ups get a chance of finding a supplier or partners for a joint venture and funding (Incumbent 1; Fashion For Change, 2021).

In spite of everything, collaboration is impeded by the fact that “we have not been raised in a collaborative culture. The market is very competitive. [...] big brands are approaching us but with the mindset of “Okay, so now we test with them and then we build ourselves, and then we kick them out”. [...] With start-ups it’s the same because the start-ups system is so competitive. Because it’s all about getting money, raising more money, going from one funding round to the other, and kicking all of your competitors out. [...] We need people to educate us how to collaborate.” (Start-up 5) Accordingly, Start-up 6 stresses that competition will always remain, however, “collaboration is important to get to a level where you can self-sustain and survive in the industry.”

Generally, a solution to collaboration, knowledge-sharing and -diffusion, and financing simultaneously is provided by accelerator programs, innovation hubs, and transition intermediary actors: New entrants can directly benefit from accelerator programs and innovation hubs (Start-up 1; Start-up 4; Incumbent 1, Industry expert 1). Within such entrepreneurial support ecosystems, both external and internal resources, such as mentoring, networking, education, can be explored and used. Combining resources creates thereby a positive effect for everyone involved, including start-ups that often lack resources. By participating in so-called “open innovation”, ideas flow between the start-up, other companies, individuals, research labs, universities, suppliers, and other relevant stakeholders (Start-up 1; Industry expert 1; Pustovrh et al., 2020). In this context, governments can play an important role. There is a need and it should be the aim of the government to launch and develop CE acceleration ecosystems to

promote the piloting and scaling of competitive CE solutions. There, public-private partnerships are a key (UNECE, 2022). Efforts can be observed in the case of the European Innovation Council's Accelerator program that has been established under the EU Horizon Europe program. It aims to support innovations throughout the lifecycle from early stage research, to proof of concept, technology transfer, and the financing and scale up of start-ups and small and medium-sized enterprises (SMEs) (European Innovation Council, n.d.).

Meanwhile, intermediaries as facilitators of innovation, engaging in network and system-building activities, hold the power to accelerate change towards more sustainable socio-technical systems. Notable examples include the Sustainable Apparel Coalition, the Global Fashion Agenda, and Fashion for Good, and the Ellen MacArthur Foundation that are setting a high bar and are showcasing successful case studies via their innovation forums of driving circularity and connecting established brands and their supply chain partners with innovators to accelerate their transformation (Industry expert 1). Aside from these rather established organizations with intermediary functions, start-ups themselves can take up the role of transition intermediaries as well. For instance, as an online platform offering both sustainable and circular fashion, Start-up 6 provides a space for small brands to be accessible by a wider audience. Interestingly, it plans to implement circular strategies into its current business model in the form of rental options. As can be seen, even new entrants can alter their business model to be more circular.

Combined with the power of digitalization and the increasing popularity of social media, intermediaries can connect with many consumers and permeate the large amount of information flow. Especially, during the peak of the pandemic when global lockdowns forced people to stay at home and many were on the internet, both intermediaries and start-ups had a greater opportunity to reach a much wider audience.

Integration and connection of solutions requires knowledge diffusion in order to align different actors and to improve the proposed solution. Subsequently, collective learning platforms and learning coalitions become crucial. An illustrative example is the Circular Fashion Partnership is a program, led by Global Fashion Agenda with Reverse Resources, the Bangladesh Garment Manufacturers and Exporters Association, and Partnership for Growth. The program aims to establish a long-term scalable transition to a circular system in garment producing countries such as Bangladesh by facilitating circular collaborations between textile manufacturers, recyclers and fashion brands in order to loop back post-industrial textile waste. By engaging local stakeholders, both national and European policy makers and investors, a conducive environment for a circular fashion system is intended to be created. Together all parties develop the needed infrastructure, identify barriers and formulate measures to scale circular fashion systems (Global Fashion Agenda, n.d).

Not only can intermediaries support start-ups, they contribute to the overall transition. Intermediaries are not concerned with protecting niches or disrupting the regime. Instead, they blur the boundaries between incumbent actors and niche innovators by being both flexible and rigid simultaneously. Indeed, this is their biggest strength. They are sufficiently flexible in order to accommodate diverse actor

networks that both spur and embed innovations, and they are rigid enough to navigate deeply rooted conditions to encourage innovations. Thus, a key function of intermediaries is to operate in and between these spaces “to link transformative impulses to established coalitions, maintain sustainability objectives, build the legitimacy of alternative discourses, and create political momentum for change.” (Kundurpi et al., 2021, p.9).

Regarding the little awareness and interest of consumers in engaging in circular consumption, targeted interventions are needed to empower consumers to make informed and conscious choices, and make circular products and practices more accessible and convenient (Holm et al., 2021). Especially, increasing convenience is important and its successful implementation can be seen in the business models of the interviewed start-ups: collection points located at relevant daily locations such as grocery stores (Start-up 1), leasing and rental options in close vicinity of the customer (Start-up 5), and secondhand shopping via trustable webshops (Start-up 4).

Interestingly, the empirical findings show the close interrelation between all barriers. For example, a business with a hesitant company culture towards circular practices will unlikely engage in the development of circular designs. Especially, with growing company size, convincing all departments is challenging. The less circular products or services are provided in the market, the weaker the consumer awareness and interest regarding circularity. It becomes obvious that cultural barriers can induce technological barriers, which then induce further cultural barriers. Another example, limited funding for companies with circular business models, including start-ups, can result from limited circular procurement. The lack of procurement means that such businesses are unable to indicate that there is a stable and profitable market for their products and services. As a result, policymakers may be hesitant and skeptical in formulating and implementing CE policies since convincing cases are missing. Thus, regulatory barriers can induce market barriers, which in turn induce further regulatory barriers. This interrelation of the barriers can undermine the development of global consensus regarding transitioning towards a CE, and can generate a domino effect towards transition failure. Another very important observation that has been made is that, although the concept of CE is not new and is heavily discussed in the industry and in legislation, it seems to be still a niche discussion among sustainable development professionals and proponents rather than among the broader public.

Chapter 6 - Conclusions

This research attempts to answer the following research question: **Which factors prevent and facilitate the potential of start-ups to influence the dominant fashion regime?** In order to answer this question, a qualitative research approach was adopted. The applied theoretical framework is the MLP on transition theory by Geels (2011). A triangulation of methods consisting of a literature review, document analysis, webinars, and self-conducted semi-structured interviews was utilized. This chapter will present the key findings of this research. The latter part of this chapter discusses some recommendations for future research, and concludes with a personal reflection.

The findings clearly indicate that the current fashion system is unsustainable, disconnected, uncontrollable, disposable, extractive, and growth-driven. Simultaneously, the findings show the deep embedding of issues and problems in society and the economy itself, and therefore require fundamental changes. With increasing societal pressures and emerging start-ups and their innovations, this regime is slowly changing. Enforcing binding standards and legislation, and collaboration among various stakeholders challenge the current status quo to a certain degree. Within the regime, global fashion leaders advocate and actively explore a range of circular practices. However, they take place in isolation and are primarily focused on localized problems and partial solutions. For example, businesses may experiment with using recycled content or recyclable materials in specific products - without a return system being necessarily in place or being widely available.

To transition successfully, multiple barriers need to be overcome. Several factors challenge the transition towards a circular fashion regime, and thus obstruct new entrants from entering and transforming the dominating regime. Through the interviews and secondary data, main barriers that start-ups face encompass cultural and market barriers. The former includes the lacking and weak consumer interest and awareness as well as partly hesitant company culture. Still, sustainability is not the most important purchasing decision driver, instead the price remains a critical decision factor. Both businesses and consumers do not know what circulatory economy is really about, how to implement circular practices and strategies into their business model or daily lives, or how and where to access circular products and services. Such knowledge gaps can be attributed to the theory of CE itself, putting circular ideas into practice (transition) and circular sales (validation), the conception and implementation of products and services (life-cycle assessment), and the reason why to become part of a CE (awareness). With lacking knowledge on the possible advantages that come with a CE, the CE as a commercially valuable business model is scrutinized. Market barriers comprise, for instance, low virgin materials prices and high upfront investment costs. Much agreement is to be found regarding obstructing and weak laws and regulations as the most pressing regulatory barriers, while a pressing technological barrier is posed by underdeveloped and inadequate recycling technologies and infrastructure, reuse and recycling.

A lock-in of industry trends and practices can also be seen as the early phase of a future transition. Indeed, many circular start-ups have emerged with innovative solutions., but exist as small initiatives

outside of the linear paradigm: Circular-oriented start-ups operate within niches where their innovative role is most likely fulfilled, but can also act at the meso level (e.g. provide larger fashion brands with services). Nevertheless, they show that alternatives are possible.

Instead of adopting an attitude that dismisses the entirety of the current linear fashion system, investigations into which current, established structure, culture, and practices of the linear paradigm need to be deinstitutionalized as well as which need to be preserved and repurposed is important. A transition from a linear to a circular fashion and textile system necessitates changes on the level of education and behavioral change, regulation, market and technology. These barriers can be overcome through governmental intervention. Policymakers have a key role to play in setting a common direction of development, shaping incentives to enable a CE, fostering collaboration to obtain system-level solutions, unlocking circular investment opportunities to meet key public priorities, and exerting continuous pressure on the market. Furthermore, the issue of high upfront investment costs of circular business models can be addressed by governmental interventions too, for instance, through the provision of public capital. This is likely to be needed since the majority of private investors do not see the potential of start-ups with circular business models yet. Still, circularity is perceived as invaluable and unfeasible, and waste is not considered as a resource. By overcoming the identified market barriers, more affordable circular products and services become available. This could be followed by an increase in consumer interest and awareness, thereby breaking the cultural barriers identified as one of the main impediments for a CE.

The key to progress is innovation, and there is a clear need for innovative business models within fashion in the pursuit of sustainability. Within the fashion industry, innovation and experimentation are manifold. At present, many of these interventions exist as small initiatives outside of the linear paradigm, but they illustrate that alternatives are possible. In fact, they are increasingly taken up by large fashion brands and retailers. Together and when brought to scale, they have the potential to transform the fashion sector. These range from innovations in technology and fibers (design for circularity and recycling), in business models and customer relations (i.a. sharing and leasing models), to innovations in value chain models and partnerships (using blockchain for traceability). Here, innovation policies can accelerate circular fashion. These can take the form of programmes with subsidies for research and development, start-ups support and investment, and tax reductions.

While predicting the future of fashion is difficult, it is possible to anticipate opportunities by nudging the direction of changes, and strengthening specific developments. While no single actor can dictate the pace of transition, activities can be triggered and other actors can be mobilized by one. Many interviewees have stated that circularity might be difficult to embrace for the fashion industry, in broader societal debates the idea receives traction and attention. At the same time, all interviewees see the unlocked value of and remain enthusiastic regarding the concept applied at scale to the fashion industry in the future. Here, the question is, if implemented and successful, these cases may not emerge fast enough for the concept of CE to maintain its momentum since start-ups and other businesses need to overturn entire value chains which consumes much time. This also means that if a CE was profitable,

company culture, lacking interest and awareness of consumers would not have emerged as core barriers from this research.

Nevertheless, a successful transition to a circular fashion industry requires not only increased business, technological and social innovation, but collaboration and strategies across society by governments, companies and citizens is equally crucial.

6.1 Recommendations for further research

This research proposes a comprehensive and current reflection on the current state of the fashion industry's transition towards circularity including challenges and opportunities that both the regime and start-ups experience. By identifying the barriers, elements necessary for the circular transition have been highlighted. The research also shows the need for changes in values and attitudes, and highlights the importance of collaboration and knowledge-sharing and -diffusion as prerequisites for a CE.

The empirical insights clearly put emphasis on the importance of socio-cultural constructs as part of discursive practices. As consumer behavior and attitudes decide over the commercial success of circular business models and start-ups, understanding social constructs and altering them is crucial. For example, the construct of "waste" needs a re-definition as it still holds a negative connotation. Within the context of a CE, waste shall be seen as a resource. Further research could investigate possibilities to induce a mindset change towards such a construct.

This theme has several unfolding perspectives for more future research. Firstly, a more detailed case study research related to ecosystems, focusing on collaboration or knowledge-sharing, would reveal more insights into the intentions, contributions, and strategic objectives of involved stakeholder groups. Secondly, further research could consider a comparative analysis of the different geographical areas covered in this study. There were indicators that the different governmental policies and business ecosystems in the areas analyzed led to distinct characteristics of the circular start-ups active there. A deeper analysis of the underlying causes and respective market and legislative landscape is necessary to gain deeper insight into these regional differences. Thus, research on this could inform policy-makers or investors on where to focus their efforts to further drive a circular transition. Thirdly, as governments and the financial market mainly assume that start-ups are pursuing market- and profit-related goals (instead of environmental and social impact), a different perspective must be put on the design of funding and non-financial support for start-ups. Here, further research on new funding and support programs, and indicators for start-ups would be beneficial.

6.2 Reflections

Besides its insights and contributions, this study also has its limitations. The MLP was an adequate and sufficient framework to investigate and illustrate the dynamics between three levels. It provides a relatively straightforward way to classify and simplify the analysis of complex, large-scale socio-technical systems in a comprehensive manner. This needs to be highlighted: the MLP only represents a simplified version of a much more diverse and complex reality. Several shortcomings of this framework have been highlighted in the theoretical framework.

Although the qualitative case-study research has allowed the collection of detailed and new information, it does not grant generalization due to the relatively small sample size. With three different types of participants (start-ups, incumbent, consultant), the background and expertise was not diverse. Certain stakeholder groups are missing. Thus, the research would have greatly benefited from the inclusion and input of stakeholders such as government representatives, financial institutions, and manufacturers, and start-ups based in other EU countries. Furthermore, the analysis is partly based on self-reported data by the start-ups, which may have caused biases as the statements partly could not be verified by a third party.

Finally, I would like to reflect on things that in hindsight I would have done differently. First, while conducting this research, it became clear that, instead of looking at all levels, a specific dynamic should have been the focal point of the research. For example, investigating the interaction between the niche and regime level in terms of collaboration. This way, a deeper and detailed analysis can be conducted. By investigating a whole ecosystem, the research turned out to be relatively “messy” and “unstructured”. Second, although the interviews delivered rich data and clear barriers to and drivers of circular fashion transition, in-person observations in the start-ups offices or events may have revealed other interesting and valuable data that may have been left untouched or hidden in interviews. Third, I have realized that prior to the interviews, the conceptual framework and its operationalization should be finalized. Instead, I was still working and re-formulating these chapters after the conduction of interviews. Consequently, the interview guide was not as well-thought and- planned as it could have been. The interview guide was based on the literature, thus the generation of new data was limited.

All in all, my own empirical findings that I have won through the interviews support most known barriers and opportunities in existing literature. However, these findings show the close correlation and interplay of both all three levels and factors within the regime level. This observation is highly valuable for the circular transitions as it shows that a shift in one level or factors can result in a change in another/within a level or factor. Also, important to note is that for start-ups to break through their isolation, they need to be engaged at the regime level, and not the other way round.

In terms of the concept of CE itself, Start-up 3 and Industry expert 1 delivered highly relevant arguments that a circular fashion future should be viewed carefully and critically: First, a CE results in the near-shoring of manufacturing to the consumer and company country. This would result in the creation

of new jobs locally, but simultaneously the economy in other countries would drastically decrease and unemployment rates would increase as most production takes place overseas or in developing countries (Start-up 3). Second, often only the environmental sustainability behind a CE is being focused on, while neglecting the social dimension (Industry expert 1). Third, theoretically garments made of fully recyclable synthetic fibers (polyester) can go through the technological cycle eternally. However, it needs to be taken into account that with every wash, more microplastics are emitted and the fiber wears down. Consequently, “the recycling content is not one-to-one, so you cannot convert 100kg polyester into another 100kg polyester - you will always have a certain loss.” (Industry expert 1) Fourth, a CE will not be sufficient as long as consumption behaviors do not change. A CE is strongly correlated to degrowth, consumption reduction, and the reusability and longevity of garments. In the end, consumers are responsible to keep products as long as possible in circularity. Only then, business models such as rental and resale are useful (Industry expert 1).

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Appendix

I. REQUEST CONTACT TEMPLATE

Hi dear XXX,

I hope you are doing well.

My name is My-Quyen, and I am a student of Environmental and Social Sciences at the Radboud University in Nijmegen, Netherlands. Currently, I am conducting research for my master thesis which aims to investigate the role of start-ups and to what extent and how they impact the dominant linear unsustainable fashion industry in moving towards circularity. In particular, the research focuses on start-ups and their business model innovations i.e. rental, swapping, re-commerce, and remanufacturing.

XXX is very interesting to me. Certainly, your insights would add value to my research. Would you be available for a talk in the upcoming weeks? If yes, please share your preferred date and time. The talk is planned for 30-45 minutes and will be held over Zoom. The talk is semi-structured, meaning there are some questions written prior to the talk, but still there will be room for spontaneous questions/discussions. Example questions that you will be asked are:

1. Circular transition: What are the most dominant factors (institutional, social, technical, economic, organizational) hindering/facilitating incumbents to engage with sustainability and circularity? Who/What do you believe are other important players that drive the transition towards circularity in the fashion industry?

2. Business model innovation: How do you think the current business models of incumbents need to change/altered to become circular? Do you think scaling up new circular business models is possible?

3. Start-ups: How do you see the role of start-ups in the transition towards circularity? Which factors (institutional, social, technical, economic, organizational) hinder/facilitate start-ups to break through and enter and be successful in the current fashion regime?

This is a broad overview of my project. If you have any questions or remarks, please share them with me. Thank you for your time in going through my message, and I am looking forward to hearing from you.

Have a nice weekend!

Kind regards,
My-Quyen

II. INTERVIEW GUIDE

Introduction:

1. Could you give a brief introduction about yourself, your work and the company/organization you are working for?

Circular Transition:

1. Could you explain your perception and understanding of the concept of circular economy?
2. What are the most important pressures on companies to engage with sustainability and circularity?
3. Who/What do you believe drives the transition towards circularity in the fashion industry?
4. What were/are the main drivers that motivate(d) the implementation of circularity?
5. How do you perceive the role of governments and consumers in the transition toward circularity?
6. How do you think the pandemic has influenced/is influencing the transition so far?

Business model innovation:

1. Can you give examples of business models that you employ / see around you that aim sustainability/circularity?
2. How do you think current business models of incumbents need to change/modified to become circular? Do you think they are able to adopt/add such business models?
3. Do you think scaling-up new circular business models is possible?
4. How do you see the role of technology in the creation/development of such business models?
5. How do you see the role of networking/collaboration?

Start-ups/Incumbents:

1. How do you see the role of start-ups in the transition towards circularity?
2. Which resources do start-ups need in order to be able to compete/scale up?
3. Do you think that the new innovative circular business models of start-ups could become the new normal in the industry?
4. In your opinion, what are the main motivating factors (technical, economic, institutional, social, organizational) for companies born sustainable to implement circularity?
5. In your opinion, what are the main factors (technical, economic, institutional, social, organizational) that keep companies from implementing circularity?

Conclusion:

1. Do you think a circular fashion future is possible? If not, which shifts are necessary or sufficient?
2. In your opinion, where will the fashion industry stand in 10 years?