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Examining the fashion industry with circular economics – how to reach and develop sustainable practices

Metropolia University of Applied Sciences
Bachelor of Business Administration
European Business Administration
Bachelor’s Thesis
30.04.2019
The purpose of the research is to suggest a processual framework for fashion brands to adapt circular economy to their operations. The research aims to promote sustainability and environmental consciousness in the fashion business.

The research project was conducted through study of literature and theory based on leading ideas and studies in the field. Qualitative research based on collecting secondary data was analysed in order to suggest a processual framework. The processual framework was selected to visually present the findings of the research clearly.

The research discovered the importance of product design and business model strategy for implementation of circularity, the minimization of waste and overconsumption in the fashion industry. The research allowed to suggest a processual framework for implementing circular economy.

Research limitations include the fact that the study was completed by exploring theoretical models and secondary data, with limited business examples, and is consequently conceptual for implementing full circularity. Nonetheless, the research provides a summary and insight into fashion and circularity combined and should be further explored.
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1 Introduction

Sustainability and eco-friendliness are popular topics today as debate of global warming and environmental preservation divide opinions. Historically, the fashion industry has been one of the most polluting industries with fast-fashion intensifying the production and consumption of clothing, where the linear mentality “create, use, dispose” dominates the field with devastating environmental effects (Perry 2018; Drew & Yehounme 2017). However, in recent years companies have shifted towards sustainability and to furthering the creation of a responsible fashion industry (Seara, Deichmann, von Berlepsch, Hase & Boger 2018). Globally, the clothing and textile industries are responsible for equal amounts of pollution compared to the shared pollution of the airline- and shipping industry. Yet, the fashion industry is not immediately associated with these industries regarding pollution amounts by the general public (Ellen MacArthur Foundation 2017).

Circular economy is proven to be not simply an environmentally friendly practice, but correspondingly creating financially positive results for companies (McKinsey & Company 2017). This point of view is undeniably thought-provoking and raises the question as to why this idea, that has been around since the 60’s, is not as widely adopted as one would think. How come major changes and further research arises in the field only today?

The researches importance is seen by continually rising interest in sustainability in all industries, including fashion. In Finland and globally, debates and marches bringing awareness to slowing down climate change are seen often. Stores focusing on sustainable goals, such as second-hand, clothing rentals and leasing, rather than on having to purchase new garments for good have seen an increase in the Helsinki region (Mikkonen 2019). The research topic: examining the fashion industry with circular economics - how to reach and develop sustainable practices focuses on circular economics and its development in the fashion industry, seeking to find the best practices for sustainability and creating change. First, the focus was on circular economy and its principles in order to see how the concept may operate with the fashion industry. Then,
the research suggests a processual framework of the circular economy for the fashion industry, discovering how the two may operate together.

2 Literature review

The purpose of the research was to examine sustainable actions in the fashion industry resulting in the discovery of the concept of circular economy. The research aims to bring awareness to the topic of sustainability in the fashion industry. A review of the literature did not find a specific connection between the principles of circular economy and their application to the fashion industry.

Introduced in 1966 (Boulding), circular economics has increasingly gained traction and has inspired other forms of ecological economics (Geissdoerfer, Savaget, Bocken & Hultink 2017). The fashion industry has transformed completely, to be unsustainable for the environment (Berg, Rölkens & Simon 2018; Bird 2018; Drew & Yehounme 2017) and the workers in the industry (Boggan 2001). However, all the levels of the fashion industry are changing (Business of Fashion 2018; Global Fashion Agenda 2018). Circular economy is beginning to impact the fashion industry (Bain 2019; Goode, Camp, Staff, Barrett & Pardes 2019) and therefore companies need to prepare for the changing business environment (Hesselbein, Goldsmith & Beckhard 1997; Dawson, Anand, Athreye, Himmelweit, Mackintosh, Sawyer, O’Shaughnessy 2006). Circular economy can bring positive change to the fashion industry (Webster 2017, McKinsey & Company 2017; Seara et al. 2018), along with sustainable innovations (Nike News 2018).

Globally, the concept of circular economics is starting to be widely adopted from the European Union to China (Mathews, Tang & Tan 2011). Hopkinson, Zils, Hawkins and Roper (2018) discuss the basic principles of the circular economy adapted from the research of the Ellen MacArthur Foundation, a major influencer in the advancement of circular economy and a circular fashion industry (2015; 2017). The authors set forward three basic principles: preservation and enhancing of natural capital by resource and waste management, optimizing resources through looping resources with technological
and biological cycles by product design strategies, and fostering an effective system to design out negative externalities of the circular system (Hopkinson et al. 2018).

The preservation and enhancement of natural capital through waste and resource management requires legislative action and policies set (Amanatidis 2018; Milios 2017) affecting greatly post-consumer textile waste creation ending up in landfills or incinerated (Hvass 2016). Recycling and re-use of textiles allow for waste being seen as value, transformed with technology to minimise resource loss and non-usable waste (British Standards Institution 2017) Building a resource management plan requires companies to look at efficient production through means such as use of water, energy and chemical usage (Global Fashion Agenda 2019). Higher accountability from supply chains is also needed when aiming to preserve the natural capital, with large fashion players needing to focus on the production extensively to drive change in the environment (Ellen MacArthur Foundation 2017; Weetman 2017) Barriers, like market forces, are required to be overcome by the companies when building the foundation for circularity (Kirchherr, Piscicelli, Bour, Kostense-Smit, Muller, Huibrechtse-Truijens & Hekkert 2018).

The looping of resources is a vital part required by the second principle of the circular economy, optimizing resources. Product life cycles are elongated by implementing specific strategical design to products to allow materials to continuously flow even at the end of their life cycles. The materials secondary lifecycle after the primary use ends needs to be kept in mind when designing to make most of the resources (Bocken, de Pauw, Bakker & van der Grinten 2016). Movements in the fashion industry like slow-fashion loop resources effectively with elongating the product life cycles, allowing for resource efficient use of materials (Ozdamar Ertekin & Atik 2014) and diminishing risks and business disruptions in supply chains (Rafi-ul-Shan, Grant, Perry, Ahmed 2018).

The third principle, fostering an effective system to design out negative externalities, requires the development and monitoring of frameworks available (Ellen MacArthur Foundation 2015) in order to create a more transparent fashion industry (Business of Fashion 2019). The current state of the fashion industry requires further policy to develop circularity further (Bourguignon 2019; Global Fashion Agenda 2019).
Disruptive business models transforming linear consumption is the trend to focus on in fashion and circularity, as technological innovation and inventive ways of consuming arise (Esposito, Tse & Soufani 2018). Ownership is changing, with new forms arising like clothes as a service (Business of Fashion 2019; Mikkonen 2019).

Fashion industry and circularity together requires design considerations, innovative business models, along with consumer and consumption changes (Niinimäki 2018: 76-127). Consequently, the need to listen to the consumers is needed. Sustainability is a top concern to generation Y and generation Z consumers (Valaei & Nikhashemi 2017; Business of Fashion 2019). Communication and marketing of circular fashion products is blocked by barriers like quality misconceptions and price worries. Therefore, circular fashion should aim to creating an experience much like any product that consumers will desire (Vehmas, Raudaskoski, Heikkilä, Harlin & Mensonen 2018).

3 Methodology

Vast amounts of literature are available on circular economy and the fashion industry. However, the concepts are generally discussed separately. Yet to be discussed are the concrete steps which a brand can take towards achieving a circular business. The research project will be literature and theory based. Qualitative research based on secondary data will be conducted to gather data on the concept and principles of the circular economy and the processes within the fashion industry. By analysing concepts of circular economy, the aim of the research is to recognize a processual framework based on the research that may be helpful for companies in the fashion industry seeking to implement circular economy to their business. The research will specifically focus on B2C and B2B fashion brands operating on the secondary level of the fashion industry. The method was selected to examine current leading ideas and studies in the field of circular economics. The processual framework model was selected to discuss the findings, as the framework will visually showcase the various steps with clarity.

The data will be collected by research of online journals and through study of related printed literature. The main problem this research aims to solve is what steps can fashion
brands take to assist them to move towards practices of the circular economy. Through this research paper the aim is to promote an environmentally friendly and sustainable fashion industry by using the principles of circular economy. Therefore, the research question to answer and explore is how circular economy can be applied to the industry: In what ways can brands operating in the fashion industry apply the principles of circular economics to their business?

As all the data is gathered, the analytical approach through questioning is as follows:

- What are the key aspects and principles of a circular economy?
- How is the fashion industry structured and how does its operation fit with the circular economy?
- How can players in the industry move towards a circular economy?

After identifying these aspects, I will proceed to suggest a framework comprised of different steps that companies in the fashion industry can implement to lead a more circular business.

4 Analysis

The analysis begins with examining the fashion industry and the diverse parts on how it operates. Analysing the current issues in the industry which may be affected positively through the adaptation of circular economy are examined in detail. Next, the focus will be on circular economics and its principles, looking at several aspects necessary to realize the circular economy, such as strategies for looping of resources, product design, resource and waste management and monitoring the system once fully realized. Realizing shifts in the way we consume and allowing to maintain natural capital in the future is crucial. Finally, a framework for fashion brands operating on the fashion industry will be created based on the features discovered.
4.1 The fashion industry

With the industrial revolution, the fashion industry is one the many fields that were completely transformed with the automatization processes. The ability to transform yarn into fabrics and then into clothing in less than half the time than before has been revolutionary for the industry. With this massive change to the industry, concepts such as fast-fashion have arisen. This resulted in prices of garments plummeting as consumption and production dramatically changed in the 21st century (Weetman 2017: 167-168).

4.1.1 Industry overview

The fashion industry is comprised of four main levels. The first is the primary level, the raw material producers. This level encompasses the overall creation of textile and yarn and other materials required to produce garments and apparel according to given design. Textiles are either natural, or man-made. Man-made textiles are generally regarded as more polluting; however, this is not always the case (Weetman 2017: 168-170). Advancing to the second level, apparel manufacturers. This level is where most fashion brands operate, as they design apparel and purchase their raw materials from the primary level manufacturers. Massive differences between players in this sector are seen, from high-end luxury, haute-couture and made to measure fashion, to companies operating in fast-fashion. As an example, two well-known companies operating in fast-fashion, the H&M Group, owning brands such as H&M, Weekday and Monki, and the Inditex Group, owner of Zara, Bershka and Stradivarius among other brands. After clothing is created, the next level of the industry is the third level, retail. On this level the clothing gets distributed to retail outlets and made available for the consumers. Some businesses, as the before-mentioned H&M and Inditex, own their retail outlets, operating at this level of the industry also. The fourth and final level is the auxiliary level, containing players such as media, consultants and organizations that work in the above-mentioned levels simultaneously, offering support services. On this level of the industry companies work in fields such as fashion public relations, media and advertising. All the stages of the fashion industry include separate, but interdependent industries. The textiles
industry for example is separate on its own. Nevertheless, it is principally dependent on
the apparel and fashion industry to sell product to (Silvia K. 2017; Britannica 2019).

4.1.2 Current state

The market size of the apparel industries for 2015 was 1,685 billion USD with estimations
of a compound annual growth rate of 2%. Recently, even as global economic downturn
has been the trend the past few years, the fashion industry has continually generated
growth (Statista 2019). Roughly 80 billion garments are produced across the globe per
year, averaging to 11 pieces of clothing per person, with the clothing and textiles industry
representing 7% of the world’s total exports (Weetman 2017: 168). Societal and
environmental aspects are increasingly important in the fashion industry, with 66% of
executives having multiple sustainability related targets in their companies compared to
55% from the previous year. Furthermore, rise between sustainability and credibility has
become clearer, with a large section of brands, 42 %, revealing supplier information to
the public (Global Fashion Agenda 2018). Sustainability concerns consumers as well as
businesses, with increased numbers of consumers interested in further information on
the origin of their clothing. Now sustainability is an essential part of planning to develop
the value chain. Furthermore, transparency is a rising trend in fashion (Business of
corporations such as the Kering Group already looking to position to the lead in a
transparent and sustainable fashion industry. Seeing a large player in the industry
committing to sustainable values, all levels of the group are impacted. Balenciaga is a
luxury fashion house owned by Kering (Kering 2019b). As Balenciaga´s chief executive
Cédric Charbit states: “I think the fact the brand belongs to Kering, and having Kering
expressing commitment towards sustainability and values as a group, makes a
difference. You work in an environment where this matters, this exists and we all are
committed to this (Business of Fashion 2019)”.

Adaptation of the circular economy would benefit issues in the fashion industry such as
massive amounts of textile waste causing monetary losses and environmental stress,
fabric dyes leaking into the environment along with harsh chemicals used in the
treatment of fabrics causing serious environmental problems and health problems arising for the individuals manufacturing clothing and the consumers wearing them (Ellen MacArthur Foundation 2017). Overconsumption and excessive wasting of consumers are major difficulties, allowed by cheap prices and extremely fast production of fast-fashion. The United Nations Sustainable Development Goals also discuss this, with goal 12 focusing on responsible production and consumption (United Nations Sustainable Development 2018). A sped-up production pace for a season creating multiple collections in fast-fashion has resulted in traditional fashion regarded as slow, as it creates approximately two collections per year (see appendix 1). The lifespan of apparel has also diminished significantly (Berg et al. 2018). The consumption rate of garments with numerous pieces ending up in landfills and incinerated is one of the main issues in the fashion industry today (Ellen MacArthur Foundation 2017).

Supply chains are crucial in the fashion industry. Fashion trends change overnight, stressing time, responsiveness and agility needed to follow massive demand. Outsourcing of production has resulted in issues like child labour and worker exploitation. Particularly in Asia, where most fast-fashion is produced today, worker exploitation, child labour and inhumane working conditions are major problems. Cases of retail brands initially not being aware of the issues in their factories have shocked consumers (Boggan 2001). Brands risk their integrity and product quality in order to produce competitively priced products that eventually create business disruptions as quality deteriorates. With the current short product life cycles, low predictability, high demand and high impulse buying, large risks appear creating a need for a flexible supply chain. Risks can be reduced through integration of sustainability to supply chains. With increased supply chain visibility in the long-term, relationships between companies and their stakeholders enhance (Rafi-Ul-Shan et al. 2018).

Another issue in recent years regarding some luxury fashion brands is the burning of their unsold stock. In 2018, Burberry destroyed an equivalent of 40 million USD of their products attempting to maintain brand exclusivity and product scarcity. This led to outrage and since then the practice has been put an end. However, the question remains of how many brands have or continue participating in this practice behind closed doors. The reputation of companies found guilty of burning their stock was severely damaged,
as the rise of ethical behaviour and sustainable actions are continually expected of brands (Bird 2018).

Nevertheless, as consumers demand more ethical behaviour from brands the consumer attitudes and behaviour do not necessarily translate to their purchasing behaviour. This is known as the attitude-behaviour gap where ethical and environmental concerns may be over-ruled by factors such as price. Still, the overall attitude-behaviour gap is irrational, with criteria changing from consumer to consumer. Personal fashion preferences are seen as more important factors than sustainability at times, depending on the consumers. Circular garments are regarded as not trendy enough or too expensive. This attitude towards circular fashion reflects the values of the many consumers, with a minority feeling as the concept of circular fashion is trendy enough and fitting to their personal style (Vehmas et al. 2018). Customers of today are leading change within the all industries (Hesselbein et al. 1997: 11-31). With generation Y consumers, purchasing sustainable second-hand clothing has increasingly become a part of the consumers social identity. Factors such as brand, price, style, and social identity are recounted as top influencers for purchase behaviour for a millennial consumer. As price is one the major purchase influencers, it may contradict the buying of circular clothing, even with strong social identity. Generation Y consumers buying behaviour is complex, with high dependency on their personal values. In cases where price is, or is not, a factor the other highly influencing factors affect the decision-making process. Nevertheless, younger consumers have been shown to be more likely to be interested in sustainable clothing compared to older consumers, making the younger consumers be more sustainably inclined when purchasing (Valaei & Nikhashemi 2017; Business of Fashion 2019).

4.2 Circular economics

With the concept originating from the 1960´s, circular economics has gained increasing amounts of attention from companies to policy makers. Kenneth E. Boulding´s publication “The Economics of the Coming Spaceship Earth” (1966) is viewed as the originator of the circular economy concept, with Boulding discussing the earth as an
open system. In the system where resources, like energy, are transformed and given new purpose after the primary purpose ends, allowing the economy to exist in harmony with the environment. This idea has been further developed throughout the 1970’s, with first mentions arising in 1976 by the European Commission with the start of forming the concept of circular economics that we know today. Multiple related concepts of environmental economics have risen in the past decades inspired by circular economics. Concepts such as cradle-to-cradle, regenerative design and the blue economy embody very similar concepts, with slight variations (Geissdoerfer et al. 2017). Longevity of resources allows companies to benefit from optimizing the value creation (British Standards Institution 2017: 22-30). The Ellen MacArthur Foundation (2015) defines the circular economy to be restorative and regenerative by design and aiming to keep products, components, and materials at their highest utility and value at all times, distinguishing between technical and biological cycles. This new economic model seeks to ultimately alter the global economic development from finite resource consumption (Ellen MacArthur Foundation 2015). Companies need to consider the scope of how they can implement circular economics, however minor it may be initially. As companies can agree what to focus on within their processes and by what actions, they can agree to begin the implementation step by step approach, within reasonable boundaries of growth and ethics that may limit the company’s conversion to circularity (British Standards Institution 2017: 36; Dawson et al. 2006). Thinking in systems and in cascades is required when discussing circular economics, as it requires innovativeness and creativity from the implementors of the concept. This means how various moving parts in the system affect one another in the entire end result and creating value from the various stages of products (Webster 2017: 48-49). It is quite a shift from how we currently view resources, therefore requiring meticulous planning to achieve full circularity.

Different shifts of the current system of linearity must be encouraged to bring change towards circularity. Implementing resource efficiency is key, done by business model disruptions and product design allowing for materials to be used in a manner that creates the most value. Taking an approach of “everything is food” to design allows the minimisation of waste. Some business models are already seen to minimise waste, by inventive company structures like Uber, minimising the need for consumers to purchase a car in some areas, and sharing car rides instead (Webster 2017: 14-22).
Below (figure 1) the difference of three economic models are visually represented. The figure shows three models: linear, re-use and circular in comparison. The differences seen are quite substantial, as the circular economy does not create non-recyclable waste at all in comparison to the linear and re-use economy. The circular economy makes use of these waste products through recycling efforts to give them new life before they become non-recyclable waste and therefore useless to future production (Government of the Netherlands 2017).

From a linear to a circular economy

![Diagram of linear, re-use, and circular economy](image)

Figure 1. Linear, re-use and circular economy visual representation and comparison (Government of the Netherlands 2017)

4.2.1 Principles

Hopkinson et al. (2018) discuss the three different principle elements necessary for an economy to be circular, the principles of the circular economy, seen on the following page (figure 2).
Figure 2. The principles of the circular economy (Ellen MacArthur Foundation 2015)
The first principle, enhancing and preserving natural capital by controlling finite stocks and balancing renewable resource flows, describes the necessity to manage resources and stock. This needs to be done in order to deliver maximum utility where it is possible. The wise use and management of materials is crucial to the circular economy (Hopkinson et al. 2018).

The second principle looks at the optimising of resources by circulating products, components and materials to allow the highest possible utility at all times in both technical and biological cycles, a focus on looping resources. Technological advances are crucial in this principle, as new and innovative ways of transforming materials to extend their lifespans need to be created. We can see the two different arrows in the figure at principle 2, one on the left and the other on the right. On the left side is the biological re-use of products and materials, with turning waste materials into bio-gas or regenerating the waste into the biosphere, allowing it to be used for agricultural purposes later and giving input back into the cycle. The right side focuses on the technical reworking of materials, such as remanufacturing and reusing the different components. Principle 2 includes recycling as well, a known way of the fashion industry to recycle unwanted clothing and give garments and textiles a new life (Hopkinson et al. 2018; Ellen MacArthur Foundation 2015). Looping the resources and utilizing the most of their capability in the economy, for example transforming waste plastic into a new material, like a sole for a shoe. This has been done by for example by Nike in the past years, with these kinds of regenerations and looping of resources optimizing the life cycle of materials and products (Nike News 2018).

The third, and final principle, of the circular economy aims to create the system to be more effective by exposing and designing out negative externalities. Principle 3 focuses on the summary of all the above-mentioned aspects and principles, as it monitors the entire system to enhance it and to avoid issues in it. By monitoring and minimizing leakage and negative aspects, we become aware of the issues, allowing us to focus to tackle them, and work further towards building an extensively more circular economy (Hopkinson et al. 2018; Ellen MacArthur Foundation 2015).
These three principles are the criteria to meet when working to build a circular economy. Several companies already have begun working towards these goals, as cost effectiveness and raw material efficiency are subsequent from implementing the circular economy into businesses (McKinsey & Company 2017; European Environment Agency 2016). Economic systems gain resilience, resulting in growth and rising employment rates from the implementation of circular economy. Companies can preserve natural capital, leading to costs being saved from material sourcing. This allows for along innovations and improved relationships with stakeholders increasing (British Standards Institution 2017: 22-24).

This framework seen above is selected as the basis of the processual framework to be suggested, as the research conducted by Ellen MacArthur Foundation is regarded most advanced in creation of circular economy. The three principles above must be met to shift to circularity, proving the importance of the three points mentioned. Three key takeaways to adapt to the fashion industry are: product looping, resource and material management and monitoring system effectiveness of the circular operations. With these three points in mind, a plan towards evolution towards a new business environment can be made.

4.2.2 Regulations and barriers

With multiple policies and action plans provided by the European Union and its various agencies, the circular economy has been a rising trend in policy makers’ agendas these past years with the continuing application of the Circular Economy Action Plan in the European Union (Milios 2017; European Commission 2019a). However, some gaps in current policies still exist, making the transition to circular economy less efficient. Three vital aspects for a comprehensive policy mix for transitioning to a circular economy are:

- Re-use, repair, remanufacture
- Green public procurement and innovation procurement
- Policies for improving secondary market materials (Milios 2017)

Especially in the fashion industry, the re-use of products is vital to allow the lifecycles of fibres to continue as new clothing. With current technology, the separation of fibres from
old garments is possible, allowing the fibres to be spun to new yarn, from there to new fabric. The use of green innovations as well is crucial, renewable inputs will allow for minimising resource use and allow to improve planning of resource usage (Weetman 2017: 171-182). Legislative actions taken by policy makers to aid conversion to circular economy are crucial for mainstream adaptation of the concept in the future, as the lacking governmental synergies are seen as one of the main problems regarding advancement of circular economy in the European Union. Main barriers for circular economy are indicated to be primarily cultural. The second and third most disruptive barriers to circular economy are market forces and regulatory forces. Technology is ranked as the lowest impact barrier. Nevertheless, its impact as a barrier cannot be diminished especially in the fashion industry where manufacturing responsibly requires technological advances in production and is therefore key in realizing the circular economy (Kirchherr et al. 2018). These four aspects are therefore seen as the core problems that must be tackled when beginning with the implementation of circular economy for an industry like fashion. As cultural issues, the lack of interest and awareness from consumers, are listed as one of the top issues. Therefore, a shift in the marketing and presentation of circular fashion products is needed. By increasing awareness for quality and debunking misconceptions for prices, the publics view can be shifted to be positive. This results in encouraging consumer having higher support and demand circular products. For example, the communication of circular fashion products should take a more humoristic or informative approach, in contrast to the perceived unexciting way circular fashion is communicated today (Vehmas et al. 2018).

Technology poses a barrier to circularity in fashion due to possible lack of investment or complexity of implementation. However, it has high potential and is a necessity in the adaptation of circular fashion. Green chemistry to elongate materials lifecycles and technologies to create more durable materials more environmentally friendly are being adapted. The digitalisation of the fashion business has also become an accelerator to circularity in fashion, with leasing and renting garments gaining popularity (Weetman 2017: 192-194). Collaboration and awareness raised through known fashion designers and organizations also strengthen the circularity in fashion, with circular fashion becoming a more widely discussed topic, without sacrificing the style of the garments (Weetman 2017, 194)
Companies have different levels of awareness for circular economy and its benefits. Therefore, the company culture is can be regarded as a barrier or an enabler, depending on the business. The levels of organizational maturity to implement circular economics (see appendix 5), ranging from level 0 to level 4. Level 0 refers to compliance of legislation, generally uninformed and uninterested companies to apply circular economy. On this level, the organizational maturity is an issue and a barrier to overcome. Level 4 on the other hand, being the highest, indicates the company culture and maturity are advantages for the company. With innovation in business models and organizational structures embraced, the companies aim to fully align with principles of the circular economy. As varying companies have varying internal culture, providing awareness for circular economics requires additional work in certain companies in comparison to others (British Standards Institution 2017: 32-33). Adapting to circularity ahead can be considered as an advantage, being able to penetrate the market for sustainability and circular products ahead of the trend. This will result in a first-mover advantage in the field, allowing great benefits for companies implementing circularity (Dawson et al. 2006: 157-160).

In addition to the European Union´s policies moving towards supporting circular economy other nations have also begun exploring the benefits of circular economy. China´s rapid growth, accompanied by pollution and waste, has resulted in China’s adoption of the circular economy practices as official policies. Being one of the industrial and manufacturing colossuses of the world with massive production capabilities, China´s transition towards circular economy gives an idea as to how popular the concept is becoming globally. In addition, China is one of the world’s largest markets for fashion with a rising middle class gaining increasing amounts of purchasing power, creating a possibly more expansive market for circular fashion (Business of Fashion 2019; Mathews et al. 2011). We also see extensively more countries and regions beginning to implement policies to advance toward a circular economy such as Japan. The Circular Economy Promotion Law took effect in 2009 in China, and since then policy advances have been made. However, East-Asian countries apart from Japan have been slower to adopt the concept of circular economy in practice (Mathews et al. 2011).
4.2.3 Cycling of resources

With regulations set globally towards moving to diminish linear consumption, different business strategies to slow down and elongate product life cycles are required. Products and goods need to be designed with intent to last and serve a secondary purpose (Business of Fashion 2019). Original and inventive business models need to be considered in addition to design strategies, as the way we consume evolves.

Cycling of resources is a method of stretching out product lifespans, through well thought-out design to elongate product lifespan through creating durable goods require fewer resources. Companies are starting to come out with products that take advantage of the looping of resources, with an example of the newly released Nike Futurecraft.Loop performance sneaker. The sneaker itself is manufactured from materials which can be 100% looped, making the shoe completely recyclable. The product took years to design and produce to be completely reusable. The shoe is ground up at the end of its life cycle, melted, and created into a new shoe from the melted residue (Bain 2019).

Cycling of resources is crucial as looping resources is required for circularity (figure 2). Below (figure 3) three different directions are identified for transforming the use of resources to a loop system: slowing down resource loops, closing resource loops, and the narrowing of resource loops. From these three directions we can see four different approaches determined: linear flow, life extension – linear, circular flow and life extension – circular (Bocken et al. 2016).
The first approach, linear flow, is the current state of how products are consumed. Raw materials are transformed into products, which are then consumed, discarded as non-recyclable waste, ending the products lifecycle. The length of the lifecycle of the product varies greatly depending on its use and purpose. For example, the lifecycle of fast-fashion clothing is extremely short, with consumers regarding garments as old as soon as on the third use (Business of Fashion 2019) It has no effect on slowing, closing or narrowing the resource flows, resulting in non-reusable waste and extensive environmental stress.

Two of the four approaches mentioned: circular flow and life extension – circular, focus on the closing of the resource loops. Meaning that with efforts of recycling, the loop among the post-use and the production becomes closed-off. This subsequently results in a circular flow of resources. With following the principles of the circular economy like re-use and recycling of resources (figure 2), resource loops can become closed through efficient resource utilization. As a result, less raw materials are required.
The life extension – linear approach focuses on the direction of slowing down resource loops. This approach is achieved with the design of long-life goods, resulting in product-life extension. The utilization periods of products are extended or are intensified, ensuing in slowing down the flow of resources. For instance, when designing garments in a sustainable manner, durability is required in design, making products last longer. This way products lifecycles can extend.

The final direction of narrowing resource flows, also mentioned as resource efficiency, focuses the aim at fewer resources in total. This makes it distinctly different from the other two directions mentioned, by diminishing the consumption of materials completely. A change in consumer purchase behaviour is required to realize full resource efficiency as overconsumption condenses product lifecycles dramatically especially in fashion. Subsequently, resource demand and production grow to satisfy the consumers hunger for newness (Bocken et al. 2016).

The looping of resources method most suitable to a company needs to be carefully evaluated according to the product or service the company provides, as all methods cannot be applied to all companies. Consequential impacts and business risks that may rise must be carefully considered when selecting the method of looping resources, as aspects such as economic viability, complexity, investment or sourcing and geopolitical risks can occur if lacking planning (British Standards Institution 2017).

4.2.3.1 Slow-fashion

With similar motivations of resource efficiency and environmental awareness as in the circular economy, slow-fashion strongly relates to its values. Younger consumers have extreme concerns over the environment, many regarding them as defining issues of our time. Their shopping habits increasingly favour brands and retailers that align with their beliefs, as nine out of ten generation Z consumers stating that companies must recognise social and environmental issues (Business of Fashion 2019). Slow-fashion has been at the front of the movement helping to slow down resource flows. As a literal contradiction to the concept of fast-fashion, slow-fashion focuses on fighting the negative effects
caused by fast-fashion. Slow-fashion promotes an approach where everyone from producers to consumers are aware of impacts of creating the garments and get fair compensations for their work in the process of producing the clothing. Slow-fashion encourages slower consumption of fashion apparel, with purchasing less, but in a higher quality and investing in sustainably made garments. The slow-fashion movement utilizes product design and that way, the slowing down of resource loops. As a result, the movement has become notable on sustainability and resource efficiency. Local approach, transparent production systems and creating sustainable products are the three key pillars of the slow-fashion (Ozdamar Ertekin & Atik 2014).

4.2.4 New business models

With actions taken to efficiently use resources, business models require innovative changes made also. 79% of top fashion executives identified self-disruption regarding business models among the top priorities for fashion companies in 2019, revealing a need for change in the industry. This change is driven by technological advances and consumer demand for novelty. Traditional brands must disrupt their businesses themselves in order to remain agile and continue being competitive in the modern age (Business of Fashion 2019). The Kering Group, one of the largest luxury fashion companies and the owner of renowned fashion houses such as Gucci, Alexander McQueen and Balenciaga, has gained great success the past years with sustainability focused changes, reaching the title of the second most sustainable company in the world according to the Global Knight’s Global 100 index at the World Economic Forum for 2019 (Kering 2019a; Kering 2019b). Projections indicate that a growing number of traditional companies are shifting to exploratory business model ventures (Business of Fashion 2019). Top fashion CEO’s are encouraged to implement circular business models further as positive disruption has highly been recommended to diminish pollution, resulting in reduced business risks (Pinnock 2019; Global Fashion Agenda 2019).
The five business models seen above (figure 4) aim at transforming the waste of companies into value and are designed for long-term success to help implement circular models for businesses. A company can reduce its material use by 90% and increase gross profit by 50% by constructing a business model following the principles of circular economics such as: circular supply chain, recovery and recycling, building products to last, sharing platform and product-as-a-service, allowing for creation of circular growth (Esposito et al. 2018). These inventive business models can apply into the fashion industry, as the four levels of the industry design, manufacture and sell products and materials. By transforming the way companies do business in the industry, the companies move away from linear consumption helps diminishing poor conduct of consumption and unethical behaviour within the industry of fashion and create opportunity to transform the market as seen today. Major changes in business models requires change from top-down perspectives, revealing the need for managerial vision-driven disruption to company actions. High levels of organisational maturity (see appendix 5) are required to be able to implement the models, as inventive action and creativity for change cannot be forced upon the companies (Hesselbein et al. 1997: 11-31).
The first business model, circular supply chain, advances the use of renewable, recyclable, and biodegradable inputs, substituting linear inputs that end up as non-recyclable waste. The model can be used by companies producing for others from raw materials, or for their own manufacturing operations. Fashion industries primary and secondary levels, raw material producers and apparel manufacturers, could find this model to be advantageous. Technological innovation and advances in clean technologies are vital in this business model, as being able to transform products back to primary materials to remain useful requires innovative technological solutions (Esposito et al. 2018). Local companies in Helsinki, like Pure Waste Textiles, use leftover textile waste from the clothing manufacturing process to create a circular supply chain. The company work with a primary manufacturer, remaking the yarn required for their manufacturing from textile waste (Pure Waste 2019). An example of circular value production (see appendix 3) through the nearshoring of production and investing in technological automation are ways to advance a circular value chain. With the production being closer, less transport is required initiating less environmental impact. This results in the overall reduction of overproduction (Business of Fashion 2019; British Standards Institution 2017).

The second model of building products to last elongates the products life cycles. This is done by six key aspects:

- Build to last – making durable products with the lasting product design at core.
- Refurbish – restoration of used products, aiming at price-sensitive consumers
- Take-back – pre-owned goods collection for re-sale, known also as re-commerce
- Upgrade – adding new features to existing products, instead of replacing it completely
- Refill – replenishing a function of the product, such as refill packages
- Repair – the fixing of a product to elongate the life cycle in case of not wanting to purchase a new one (Esposito et al. 2018)

In this business model we see the importance of product design and recycling. Through technological advances and product design the fashion industry can move towards these types of business models. Consumers have begun to shift away from traditional linear
models of consumption with ownership changing and the want from consumers to act more sustainably on the rise (Business of Fashion 2019). As recycling and second-hand purchases, along with re-commerce have developed to be increasingly popular ways for people to consume fashion sustainably, the largest hurdle to overcome in this matter is the consumer attitudes towards circular fashion. With some consumers seeking circular fashion out with determination, others have large reservations for purchasing these categories of products. Consumers reservations arise from issues in image, marketing and communication (Vehmas et al. 2018). However, many businesses such as Vestiare Collective, Swap, or Poshmark have created online shopping platforms fuelled by recycling and second-hand purchases, in addition combining it with an attractive way of shopping for millennials, online. These companies focus lie in brands and targeting of consumers who seek out these kinds of brands at lower costs. The overall charm to many is sustainable practices made easy, also at an affordable price point. The platforms work by a consumer with a product, for example a piece of apparel or clothing they no longer require for some reason, listing it on the platform marking the condition, price and adding an image of the garment. Then anyone on the platform can see this post, allowing them to purchase it. E-bay and other companies have been focusing on such a model for years already creating consumer-to-consumer environments online, but only now are we seeing increasing amounts of online second-hand stores, with the sole focus on luxury brands, or simply only clothing recycling (Esposito et al. 2018). This means that modern fashion retailers are competing with companies such as Amazon and E-bay, in addition to traditional fashion companies (Business of Fashion 2019).

The third business model, product-as-a-service (PaaS) platforms have been on rise as well, with clothing regarded as a service, not as a product. Key features of this model include:

- Pay for Use
- Leasing
- Rental
PaaS is fuelled by the modern consumer’s want for newness, all while embracing sustainable behaviour. Research has shown the average consumer to purchase 60% additional amounts clothing than they did just 15 years ago. Nonetheless, keeping the clothing for half as long today than they used to before (Business of Fashion 2019).

The fourth business model, the sharing platform, allows multiple consumers use the same product, sharing this trait in similarity with the PaaS business model. However, the sharing economy is more focusing on individuals and consumer-to-consumer transaction, while PaaS focuses on companies providing subscription-based models for consumers (Esposito et al. 2018). PaaS platform businesses have gained recognition in the past years, with even a subscription-based clothing rental shop opening in Helsinki as well, Vaatepuu. The model works by a monthly subscription, giving customers access to rent pieces from the store for a month at a time. Customers have given praise to the concept, with claims such as it combats the overconsumption behaviour that worries them. This way the consumers enjoy new clothing and get the chance to try on something new without the guilt of buying products only to wear them once (Mikkonen 2019). Other subscription-based American companies, for example Rent the Runway and Le Tote, are making themselves increasingly known, creating an everyday wear alternative to traditionally known clothing rental services, like evening- and costume-rental, that provide only occasion wear. Rent the Runway was valued at 800 million USD in 2019, proving that this inventive business model has volumes of potential to change ways people consume clothing (Goode, Camp, Staff, Goode, Barrett & Pardes 2019). In addition, trends such as the “no-buy challenge” and minimalism have fuelled the interest in services that do not require to buy, but still allow the consumers to wear trendy apparel (Treviño 2019; Mendoza-Moyers 2019).

In the final business model, recovery and recycling, we see waste transformed into a valuable resource by finding ways to utilize the waste created from production cycles and integrate the new material back into the business models production stage (Esposito et al. 2018). Regarding the fashion industry, the largest issue is textile waste. It is a side-product of production and results in garments being discarding improperly to
landfills (Ellen MacArthur Foundation 2017). With sorting and processing of the clothing and textiles by colour, then chemically reworking the fibres to create new yarn, and from there producing new fabric material is one way to utilize this business model in the fashion industry, as done by Pure Waste (see appendix 2) (Pure Waste 2019). By businesses participating in these kinds of manufacturing operations, textiles and garments are allowed to have significantly longer lifespans and avoid ending up incinerated or in landfills. With returning the textiles to the primary level of the fashion industry, circularity is advanced and textile waste is reduced, along with saving water from growing less cotton for textiles (Pölkki 2017). Major retailers such as the fast-fashion conglomerate H&M have begun with steps towards this business model, by offering garment recycling opportunities in their stores since 2013 (H&M 2019a). Fast-fashion brands part of the H&M corporation, such as COS, Weekday and Monki in addition to all other brands owned by H&M, make up a large section of the fast-fashion market in northern Europe. By the parent company committing to environmental consciousness, so do the brands owned by the company. 57% of the H&M groups resources used to create their products are sustainably sourced or made of recycled materials. Actions like these taken by the H&M group inspire for sustainable actions, reflecting well on the company and reduce their environmental impact on the planet (H&M 2019b; H&M 2019c). Circularity of resources is seen to reach even major fast-fashion operators such as H&M, giving reassurance of the future of sustainability in fashion and its movement into mainstream purchasing behaviour. Having large multinational fast-fashion businesses recognise and alter their behaviour to sustainable actions gives insight of the consumers also. With companies seeing increasing consumer demand for sustainably sourced clothing, efforts are made to move towards these practices.
4.2.5 Product design

The design of products plays a massive role in the fashion industries attempts to advance to a circular economy. With currently fast-fashion products designed poorly and for short-term use, the issues start arising as garments are disposed of due to poor quality. The business models discussed (figure 4), all heavily rely on developing sustainable products through design. By keeping in mind principles of the circular economy when designing, resource loops can be slowed down to create products that last longer and can be re-made to serve a second purpose after the initial lifespan ends. By adopting new design strategies, seen below (figure 5) resource loops can be slowed down significantly (Bocken et al. 2016; Weetman 2017: 186-192).

**Figure 5. Design strategies (Bocken et al. 2016)**

Designing for long-life cycles of products is the first strategy to slow down resource loops. Designing for attachment and trust and for reliability and durability are included in this section. Designing for attachment and trust refers to designing products that will be trusted and loved for longer. Designing for reliability and durability states the physical durability of the product, so that the product will not deteriorate rapidly or fail within a certain time period. These product design strategies in mind, the product is most likely to elongate its life span (Bocken et al. 2016; Weetman 2017: 186-192).
Designing for product-life extension is the second design strategy in slowing down resource loops. This includes designing for ease of maintenance and repair, upgradability and adaptability, standardization and compatibility, and for dis- and re-assembly. Designing for ease of maintenance and repair allows products to serve longer by keeping them in useable condition and keep the main functions of the product intact. Upgradability and adaptability design strategy in mind, products are designed in a way that allows them to be modified and changed in the future, to have additions made to the existing products features. Design for standardization and compatibility allows for products to have interchangeable repair parts, along with being interchangeable with other interfaces and platforms. Finally, the design for dis- and re-assembly focuses on the product being able to be separated and reassembled with ease for other purposes in the future. In this design strategy, it is vital to design with intent for when separating products into technological and biological cycles (figure 2) (Bocken et al. 2016).

The three last design strategies: designing for technological cycle, for biological cycle and for dis- and re-assembly all look to completely close resource loops. The design strategy for technological cycles focuses principally on goods that deliver a service, in comparison to products that are consumed. The aim is to focus the technical capabilities of the product to be designed so, that there is a future use for the product, allowing it to be reworked or recycled for a future function in the economy. The aim is to have a continuing flow of resources, much as how textile waste can be chemically broken down into fibres, then spun into yarn, and this way re-worked to create new textile and continuing the cycle. Biological cycle design focuses more towards products of consumption. The aim is on designing with safe and healthy materials that when biodegraded, releases nutrients back into the system as energy inputs or begin a new cycle themselves. In the fashion industry, this can be executed by seeking out locally produced and sourced materials, as well as natural raw materials that do not harm the environment with their handling or treatment, slow-fashion as a good example of this. This will result in products to be safer and more natural along with them being easier to rework to be new materials in the future. Designing strategy for dis- and re-assembly overlaps with the two before-mentioned loop closing strategies. When designing products in this approach, it is necessary to ensure the ability to separate the technological and biological materials from each other at the finish of their life cycle,
along with focusing on the ability to also re-assemble them with ease (Bocken et al. 2016; Circular Fashion 2019; Weetman 2017: 186-192).

4.2.6 Resource and waste management

Waste management and resource efficiency are crucial for the fashion industry to decrease the amounts of garment waste, with the most common ways being recycling and reuse. Both these actions aid reducing need for additional resources, also playing a substantial role in resource and waste management when focusing on reducing consumers unsustainable purchasing to provide longevity for products (Hvass 2016; British Standards Institution 2017: 4-6, 22). The first principle of the circular economy (figure 2), discussing resource and waste management, is a key aspect to focus on when shifting to a circular economy, with proper and efficient resource and waste management required to loop resources and build a resource management plan. Policies like the Roadmap to a Resource Efficient Europe as a part of the Europe 2020 strategy has been adopted to further conversion to circular economy on an EU level, along with extensive legislation set on pollution, production and waste prevention and management (Amanatidis 2018). Correspondingly, major fashion company’s CEO’s are being driven towards smarter and effective resource management. The Global Fashion Agenda ranks the efficient use of water, energy and chemicals as one of the four core priorities for immediate implementation for fashion companies. The largest impact seen here is on the primary level of the fashion industry, with the manufacturing and treatment of the textiles. Fabrics such as denim requires large amounts of water and treatment, making it harsh on the environment. Supply chain efficiency and accountability is necessary to provide a successful resource management plan for reducing waste, working towards circular economy (Global Fashion Agenda 2019; Ellen MacArthur Foundation 2017).

4.2.7 System effectiveness

In order to maintain a previously set-up system of circular economics, system effectiveness needs to be re-assessed to ensure the most beneficial use of the circular operations. Further developing and monitoring the existing frameworks allows
companies to be aware of and design out negative externalities. This requires taking in account all the before-mentioned aspects of the framework and working to develop the weaknesses away (Ellen MacArthur Foundation 2015). In 2018, the European Commission published a framework for monitoring the transition towards the circular economy consisting of ten indicators grouped into four main areas to consider. The four areas: production and consumption, waste management, secondary raw materials, and competitiveness and innovation (Bourguignon 2019). The full list (figure 6) of the indicators provided by the European Union is seen below.

Circular economy monitoring framework

1. EU self-sufficiency for raw materials
   The share of a selection of key materials (including critical raw materials) used in the EU that are produced within the EU

2. Green public procurement
   The share of major public procurements in the EU that include environmental requirements

3a-c. Waste generation
   Generation of municipal waste per capita, total waste generation (excluding major mineral waste) per GDP unit and in relation to domestic material consumption

4. Food waste
   Amount of food waste generated

5a-b. Overall recycling rates
   Recycling rate of municipal waste and of all waste except major mineral waste

5a-f. Recycling rates for specific waste streams
   Recycling rate of overall packaging waste, plastic packaging, wood packaging, waste electrical and electronic equipment, recycled biowaste per capita and recovery rate of construction and demolition waste

6a-c. Private investments, jobs and gross value added
   Private investments, number of persons employed and gross value added in the circular economy sectors

7a-b. Contribution of recycled materials to raw materials demand
   Secondary raw materials' share of overall materials demand – for specific materials and for the whole economy

8. Trade in recyclable raw materials
   Imports and exports of selected recyclable raw materials

9a-c. Patents
   Number of patents related to waste management and recycling

Figure 6. Circular Economy Monitoring Framework, (European Union Online 2018)

Following these indicators listed above, the monitoring of circularity can be assessed over time. Analysing the results allowing to observe trends rising or decreasing will give insight on which actions to focus and improve on. With recycling rates on the rise in the European Union (see appendix 4), shopping for second-hand clothing and recycling
actions have increased awareness for a more sustainable fashion industry (European Commission 2019b). For being able to find these weaknesses and truly improve the system for the better, transparency and discussion with consumers of their needs is necessary, helping drive positive change. As the fashion industry suffers from a growing trust deficit, consumers are not aware of processes regarding sourcing, production or how the product came to be. Subsequently, consumers demand information like where from and how the products are made. With 66% of consumers stating the willingness to pay additional for good that are sustainable coming forth (Business of Fashion 2019). Nevertheless, the fashion industry is not yet ready to fully commit to circularity, as increasing amounts of awareness is still needed for circular practices, with many consumers preferring novelty and low costs over quality and sustainability. For fashion to further evolve towards circularity, monitoring of current practices is inevitably needed to create a path towards circular economy for the industry (Global Fashion Agenda 2019).

5 Findings

Overall, the analysis proved the importance of fashion moving towards circularity to lie in business model disruption and product design, allowing to loop products and materials to circularity. The rising desire of sustainable goods should be embraced by brands in their communication and marketing, to bring awareness of circular consumerism to the mainstream. New business models and disruption of old ways of consuming on a linear approach suggests if traditional fashion companies do not adapt to these changes, they may see their revenue drop dramatically in the future. With the three principles for circularity in mind, a plan towards progression towards a new business environment can be made given the businesses are willing to commit to change.

The research discovered the importance of product design and business model strategy for implementation of circularity in fashion. Within the three principles (figure 2), the looping of resources (figure 3) and product design strategies (figure 4) support realising the goals of circularity. Therefore, they are crucial to transitioning away from a linear economy of the fashion business. The overall management of resources and waste is
vital aspect, required to plan the circular activities execution. Monitoring the circular practices and development in activities where necessary is vital. This ensures the circular system works effectively, cancelling out the creation of non-reusable waste. Circular economy and the fashion industry can exist in symbiosis with design strategies, policy advances made and consumers demanding changes to linear production. However, all the parts of the system are essential to work transparently and effectively together in order to generate a functional system (Niinimäki 2018: 152-169).

Found below (figure 7) is the suggested processual framework based on the research’s findings. It embodies the most crucial steps to follow for brands wishing to implement circular economics to their business.

**Figure 7. Processual framework for brands to move towards circular economy**

The first step seen in the figure is to overcome, referring to the four barriers of the circular economy. The four barriers: cultural, market forces, regulatory forces and technology must be overcome by the company to begin shifting to a circular business. The cultural aspect looks at the company culture, requiring the want and effort to transform to circular economics from linear ways, reaching a high level of organisational
maturity. In addition, the scope of extent and actions for implementation must be determined. The management of the company is required to commit to the steps and implementing of circular principles. The second is the market forces, indicating the company must have a market to target with their circular products or have current audiences’ interest for circular endeavours to allow revenue creation in the future. With increasing demand of sustainable and environmentally conscious apparel, fashion brands must be able to communicate and market products in a way to create desire from consumers. Thirdly, the company must align with regulatory forces and authorities. In the European Union, this requires meeting product standards and regulations. Technology is the final barrier to overcome in step one, required for the company to be able to have ways to manipulate the materials to generate less waste. Working with specialised manufacturers with expertise on the subject to create new products out of waste with automation can be implemented (see appendix 3).

The second stage in the cycle towards circularity is planning. Meticulous resource and waste planning are required to ensure the second life cycle of the materials. Consumption and necessary inputs must be evaluated, as purchasing too much of a sustainable material or producing in too large quantities remains wasteful, even if the material is not. Proper waste management, be it recycling or remanufacturing, is crucial towards circularity with looping resources. The third step based on the research is designing with intent. Brands must design their products with a specific strategy in mind, allow the product to be made in a regenerative manner. Looping of resources needs to be remembered in this stage, as materials will live on as new products after one purpose comes to an end. Disruption is the fourth phase recognized, as moving away from traditional consumption requires non-traditional actions. New business models and innovation to meet the ways consumption is changing are required, as technology and consumers change with the time. As a circular system has been set-up in a business, the following step to implement is monitoring. Communication with consumers is required to show commitment, transparency and trust regarding business operations. Consumers need full transparency, as they will give feedback allowing the brands to recognise the
issues in the business, allowing to move on to the final step of the process: enhancing and improving their circular processes.

Reflecting on the research, the frameworks studied for implementing circularity to all forms of businesses, contain similar aspects as the framework proposed specifically for fashion businesses. The difference in the two are however the importance of product design, being in the centre of the fashion business. The differentiation is seen as materials to create the design must be also selected with great intent, to ensure durability. Not only is the design of the product crucial, but the technological capabilities. With fashion often being paralleled with creativity and beauty, the industry needs to shift to more practicality and capability, along with creativity to advance circularity. The supply chain of fashion requires massive transformation as well, with brands being required to initiate change and demand it from their suppliers.

6 Conclusions

Even as circular economics is a topic that has been discussed for many decades, it has been in the most recent years extensively researched and discussed further, as sustainability and environmental concern have been rising amongst consumers and the fashion industry has been a major cause of these concerns. A processual framework discussing in what ways can brands operating in the fashion industry apply the principles of circular economics to their business was created through the research conducted on circular economics and the fashion industry. With the advances in the concept of circular economy, this research may inspire others to continue to research circular economics further or implement the framework and principles discussed in this research to real-life scenarios. The interdependence of the fashion industry with sustainable actions needs to be recognized to diminish the polluting impact in the future.

Research limitations include the fact that the study completed by exploring theoretical models and secondary data, with limited business examples, and is consequently conceptual for implementing full circularity. The research could have been improved in exploring the relationship between brands and suppliers and consumers. How the brands
can influence change is required to study in further detail. Nonetheless, the research provides a summary and insight into fashion and circularity combined and presents an opportunity for further research. A suggestion of applying a furthermore practical approach to the research, testing the hypothesis in real life businesses, ensuring the theories feasibility.

Careful resource and waste management, with planning of product design strategies and resources used becomes essential while disrupting the way we consume, from linear to circular. Monitoring and enhancing the system with transparency and communication with the consumers will aid in the creation of a circular fashion system where companies will not exploit the environment in our appetite for newness. By moving to circular economy through the framework provided, the industry will exploit fewer resources and become more profitable by transitioning away from a linear economy. With re-inventing supply chain and production in the business models’ companies operate with, the creation of a circular fashion industry is possible to build a sustainable future.
References


Appendix 1. Fast-fashion versus the traditional fashion schedule

The duration of an end-to-end fashion cycle widely varies by company.

**Fashion cycle duration, weeks**

<table>
<thead>
<tr>
<th>Category</th>
<th>Planning, design, and product development</th>
<th>Sell-in</th>
<th>Production and delivery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global hybrid fashion company</td>
<td>32</td>
<td>10</td>
<td>19</td>
</tr>
<tr>
<td>Global denim company</td>
<td>29</td>
<td>10</td>
<td>17</td>
</tr>
<tr>
<td>Global premium apparel brand</td>
<td>19</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>European hybrid brand</td>
<td>22</td>
<td>2</td>
<td>20</td>
</tr>
<tr>
<td>Global premium lifestyle brand</td>
<td>12</td>
<td>6</td>
<td>18</td>
</tr>
<tr>
<td>US lifestyle brand</td>
<td>15</td>
<td>2</td>
<td>17</td>
</tr>
<tr>
<td>Global vertical fast-fashion brand</td>
<td>2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Approximate.

McKinsey&Company

Source: (Berg et al. 2018)
Appendix 2. Pure Waste Textiles production process

Our products are made of textile waste, leftover from the clothing manufacturing process.

We turn the fabrics into products that save huge amounts of fresh water.

We first sort the waste by colour then we refiber and spin it into new yarn.

It takes over 11,000 L of fresh water to grow 1 kg of cotton.

No dyeing

This allows us to produce fabrics without dyeing and without use of fresh cotton.

Source: (Pure Waste 2019)
Appendix 3. Nearshoring and automation enabling a circular value chain

Exhibit 16: Nearshoring and automation will be important enablers to reach a circular value chain

Circular (zero waste) design process

Production of renewable and sustainable fibres

Improved recycling business case by eliminating shipping

Co-located collection and recycling of textiles

New resource efficient fabric production

On-demand distribution and retail sales

Automated production of high quality customised garments

Could increase the value of fast fashion items for consumers and pro-long garment life

Source: (Business of Fashion 2019)
Appendix 4. Recycling rates in the EU

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Value</th>
<th>Trend</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recycling rates</td>
<td></td>
<td></td>
</tr>
<tr>
<td>① Recycling rate of municipal waste (percentage)</td>
<td>46.4 [2017]</td>
<td></td>
</tr>
<tr>
<td>② Recycling rate of all waste excluding major mineral waste (percentage)</td>
<td>57 [2016]</td>
<td></td>
</tr>
<tr>
<td>Recycling / recovery for specific waste streams</td>
<td></td>
<td></td>
</tr>
<tr>
<td>① Recycling rate of overall packaging (percentage)</td>
<td>67.2 [2016]</td>
<td></td>
</tr>
<tr>
<td>② Recycling rate of plastic packaging (percentage)</td>
<td>42.4 [2016]</td>
<td></td>
</tr>
<tr>
<td>③ Recycling rate of wooden packaging (percentage)</td>
<td>39.8 [2016]</td>
<td></td>
</tr>
<tr>
<td>④ Recycling rate of e-waste (percentage)</td>
<td>41.2 [2016]</td>
<td></td>
</tr>
<tr>
<td>④ Recycling of biowaste (kg per capita)</td>
<td>81 [2017]</td>
<td></td>
</tr>
</tbody>
</table>

Source: (European Commission 2019b)
Appendix 5. Levels of organizational maturity for implementation of the circular economy

Source: (British Standards Institution)